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FIRMINGER'S

MANUAL OF GARDENING

FOR INDIA

EIGHTH EDITION (REPRINT)

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PUBLISHERS' NOTE

THIS present edition of Firminger's Classic of Indian Gardening is a reprint to meet the extra heavy demand which India's 'Grow-more-food' campaign has created.

THACKER SPINK & Co.

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BIOGRAPHICAL NOTE

NEARLY fifty years have passed since my father first set to work on the preparation of the work which now appears in a fifth and revised version, and eighteen years have gone by since he entered his eternal rest. For any work of scientific importance to have passed through the searching ordeal of the latter half of the nine-teenth century is in itself an achievement, and the labours of my father's editors—first Mr. St. John Jackson and now Mr. Cameron—will be regarded, at least by my family, as a very real tribute to one whose personality can, in the natural order of things, be remembered by but few. It has been suggested to me by some to whose wishes I am bound to defer, that the appearance of this new edition affords an opportunity for placing on record the few facts which are known about my father's career, and the deep impression which his singular character and attainments made on his relatives and friends.

Thomas Augustus Firminger was born in the Parish of St. Pancras in the year 1812. He was the eldest of three children born to Dr. Thomas Firminger, who, some years before his marriage to Miss Elizabeth Shepherd, had come up to London from the family home at Egerton on the extreme edge of the Weald of Kent. In London, my grandfather had established a reputation in the scientific world, and for some years he had acted as deputy to the Astronomer Royal, N. Maskelyne, whose sister, it will be remembered, married the great Lord Clive. The memory of three generations thus once more serves to span a marvellously lengthy period of the history of Englishmen in India. In later life, Dr. Firminger, who had declined the honour of knighthood at the hands of George III, devoted himself to the task of coaching candidates for Haileybury, and to a generation of the Indian Civilians now passed away the name of Firminger was associated with examinations successfully passed, even as it is to-day connected with "Gardening in India." My grandfather departed his life many years before I was born, but I can well remember the tones of respect and even awe with which the name of "the Doctor" was ever mentioned by the villagers of Bury Street. In the Edmonton house there was a much dreaded electric machine provided with a huge red top revolving round a cushion of silk; terrible were the experiences of domestics who chanced to tread upon a certain metal plate near the dorway. There was supposed to be nothing which the Doctor did not know, and no one could say where his powers began or ended. Visiting in Egerton, in 1897, I was surprised to find that the Doctor's memory had not been forgotten by the village folk.

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Edmonton is now almost a part of London, and even "Bury Street" (a distinct village and "a street"), the part of Edmonton in which our house—Warren Lodge—was situated, has been invaded by an ever-increasing labyrinth of artisans' dwellings. In the early part of the last century, however, Edmonton was a country place much beloved of literary men. Southey was my grandfather's near neighbour at Enfield, while Charles Lamb and his sister spent their pathetic life in Edmonton itself. Even in my own boyhood, the "Bury Street" folk spoke the rustic dialect of Middlesex, and many were the drunken fights with intrusive cockneys at the Stagner. Within a few hundred yards of our gates stood Bury Hall, once the home of the regicide Bradshaw. Looking from the west windows of Warren Lodge, the eye travelled over lawns, fields, meadows to a horizon shut off by a thick rockery. There was then no dreary line of artisans' houses to spoil the view. It was a famous home for a young naturalist. A few miles' walk would take one to the then unspoilt villages on the Lee-side, to Chigwell and Chinkford and the glades of Epping Forest. The garden of Warren Lodge was ever the object of my father's constant care, and if the reader cares to refer to Sir W. Thiselton Dyer's (my father's nephew) works on the Flora of Middlesex, he will note frequently such entries set against rare wild-flowers—"found at Warren Lodge." In the midst of such a country, and in a house filled with scientific implements, my father spent his boyhood.

His college at Cambridge was Pembroke; he took his degree in 1837, and was ordained to the curacy Sittingborne in Kent. In 1846 he was appointed "assistant chaplain" on the Ecclesiastical Establishment of the Honourable East India Company. His service is dated October the 4th of that year, and this must have been the day when the good ship bearing him to India reached Diamond Harbour. For six months he was established by Bishop Wilson at Saugor the Central Provinces, and then was despatched to Ferozepore. Here he remained during the anxious time of the Second Sikh War (1848-49). How much of the war he saw—and he must have seen a good deal—I have been unable to discover, but his impressions are recorded in a sermon preached on the occasion of the first opening of the monumental church of St. Andrew, Ferozepore; and subsequently printed by request.

"It is now but a little more than six years ago, since the large and powerful army of the Sikhs crossed the river and invaded this territory—an event which, as it would seem, was wholly unexpected and for which we were but very inadequately provided. Almost immediately their first engagement took place, which, although attended with success to us, was far more conducive than otherwise to inspire the enemy with confidence. But it was in the second conflict—that of Ferozshuhur, which happened a few days afterwards—when the arm of God's merciful protection over us was most

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distinctly to be discerned. It was late in the day when this conflict commenced, which was interrupted and not decided when darkness set in. Wearied and exhausted, and in confusion, our troops were harassed during the night by the continued fire of the enemy upon them. And upon the following day, with their ammunition all expended, they were ill prepared to contest the field even with that wing of the enemy's army which had been already opposed to them. While in this condition, the second wing of the Sikh Army made its appearance, commanded by Tej Singh. How inevitably disastrous must have been our fate, had this leader brought his forces at once into action, is a fact upon which there appears to be little difference of opinion. This, however, to the amazement of all, he refrained from doing, and thus relieved our troops from the prospect of immediate destruction, and warded off the peril, which seemed to threaten even our occupation of India. Many explanations have, of course, been assigned for the apparently unaccountable conduct of this man. It has even been said that he betrayed designedly the interest of his people, and that so far from being desirous of gaining for them a victory, he made it his principal object to lead them to destruction. His motives, however. we have no intentions of discussing—they do not affect the point we are insisting on. We will not ask why he acted in so extraordinary a way, whether from ignorance, want of skill or treachery. But we ask why it was that upon so alarming an occasion the enemy happened to have such a man for their leader. And the reply, which we think must necessarily present itself even to the obtusest mind is, 'It is the Lord's doing, and it is wonderful in our eyes.' 'If the Lord Himself had not been on our side when men rose up against us, they had swallowed us up quick when they were so wrathfully set against us.'

"About two months after this occurred the concluding battle of the campaign, which resulted for the time in the total overthrow of the enemy, and although not one involving such imminent peril as the preceding, is still admitted to have been aided towards a favourable issue by treacherous councils in the enemy's leaders. We shall say no more on this topic, than that any who have made themselves acquainted with the details of what is called the Sutledge Campaign, can hardly fail of tracing throughout the guardian hand of God over us."

The passage which we have quoted supplies a remarkable illustration to the argument in regard to God's miraculous Providence stated by Cardinal Newman in his *Grammar of Assent* : the sermon indeed anticipates the argument of the *Grammar*.

About the year 1854, Firminger commenced a series of tours through the great historical cities of Northern India. His impressions were recorded in a whole series of portfolios full of beautiful water-colour and pencil sketches. In after years, he allowed himself to be persuaded to send two small oil pictures of native crafts on

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the Hughli for exhibition at the Royal Academy, and although the pictures were hung in a place "on the line" which would have excited most artists to further achievements, yet he would not consent to exhibit his work again. Indeed he was so reticent in regard to his work as a painter, that he would allow none of his pictures to be hung in the house save in his two studies and dressing room. The water-colours, so much esteemed by all who saw them for the first time after his death, were during his lifetime, bidden away in a bureau.

Towards the close of 1854, my father took his first furlough. While taking temporary charge of the Parish of Bapchild in Kent, he met for the first time my mother's family. The Rev. John Buchner, the grandson of the Admiral who played so important a part in the Mutiny of the Nore, a nephew of a recent Bishop of Chichester, and brother to a noted portrait painter, had commenced his career in life with a commission in the Rifle Brigade, and had seen some active service in Kaffir Wars in South Africa. He abandoned a promising military career, and after taking his degrees at St. John's, Cambridge, he was ordained, and, soon received first the living of the little Sussex village of Climping and then that of Bapchild in Kent. In May 1856, he married his second daughter, Georgiana, to the Rev. T. A. C. Firminger, Assistant Chaplain, H. E. I. C. S. In the following October, after a visit to Edmonton, the newly-married couple set sail for India, and arrived at Calcutta early in that year of ineffable disaster and horror—1857.

Fortunately for my mother's ease of mind, my father was not sent back to his old station, for in May, 1857, the two native regiments at Ferozepore mutinied, and, despite the presence of a British regiment and some Artillery, destroyed the cantonments and the memorial Church at which my father had preached the opening sermon in 1852. Instead he was sent to Howrah where, save on "Panic Sunday," when the railway men came to Church armed, the Mutiny inspired indignation rather than fear. An old Calcutta resident indeed has told me that in her memory Calcutta was nearer to a panic during the plague riots of 1897-8 than it was even in 1857. On the occasion of "Panic Sunday," my father preached from the text of Isaiah, which stands as the motto to Keble's *Christian Year*. "In quiteness and confidence shall be your strength." It is not very surprising to learn that after his experiences at Ferozepore, the alarms of "Panic Sunday" had not perturbed the preacher.

The idea of a work on Indian Gardening apparently came to my father's mind during his stay in the Punjab. A friend, on the point of leaving for England, had left in Firminger's care some valuable plants, and it was to this circumstance the origin of the great book is to be assigned. But so great was the author's reticence on the score of his own peculiar accomplishments that even his wife did not discover that the book was in course of preparation until about the year 1860.

At Howrah, Firminger was in easy distance of the famous Botanical Gardens, which were at this time under the care of his friend, Mr. Errington. Another friend was Mr. Stalkart, of Ghoosery, memories of whose unlimited kindness and hospitality have been treasured up by at least three generations of Calcutta residents. The extent to which this book is indebted to Stalkart, I cannot measure, and perhaps the author himself could scarcely have done so.

In February, 1859, the author's health broke down, and he and his wife were sent on sick leave to what were then in popular parlance styled the "Nelly Grey" hills—the Nilgherries. The opportunity for study in the gardens at Ootacamund, then under the care of Mr. McIvor, was utilized to the full, and when my father, now a senior chaplain, returned to Bengal to assume charge of Chinsurah, great progress had been made with the book. Chinsurah at this time was in all her glory as the military depôt for Bengal. *Thornton's Gazetteer of India*, published in 1858, tells us that the site of Chinsurah "is said to be better than that of Calcutta, and it is considered one of the healthiest places in Bengal." A few years later, however, opinion veered round in the other direction. The depôt was removed, and the imposing barracks turned into a kutchery. The still beautiful grounds in which the Hughli College stands are all that remain of one of the best cared-for botanical gardens in India.

The Firmingers' house at Chinsurah was one of the fine old residences built in the days when the Dutch conducted a thriving trade in the now decaying town. It stood on the maidan and was provided with a tank of its own and a lovely garden well stocked with not only Indian, but English fruits and flowers. The majority of my father's readers will be familiar with the quaint little Church of Chinsurah with its walls covered with the escutcheons of Dutch Governors now sleeping the sleep of the just. In addition to the spiritual care of Chinsurah, the chaplain in those days tended to the needs of the people of Raneegunge, the then terminus of the E. I. Railway where, under my father's fostering care, a church was erected. This church no longer exists. Among friends at Chinsurah, my mother remembers best Mr. Thwaites, the Principal of the College, Judge Lilly, Dr. Mackay of the Scotch Presbyterian Mission, and, not least, Babu Kissenpaul.

In 1863 (March 9) Firminger, after having seen the present work through the press, left India on 18 months' medical leave. I gather that the leave was extended by short periods until January, 1866, when, leaving his wife and family in England, he returned to fulfil the short period of residence due before pension. He was

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now appointed by Bishop Cotton to Gowhatti in Assam. Here, of course, he made the acquaintance of that lover of horticulture, General Jenkins. The Rev. S. Endle, the veteran Missionary of Assam, tells me that he well remembers meeting my father when he accompanied a wing of the old 35th Westmorland Regiment in the Bhutan expeditionary force.

"Your father," writes Mr. Endle, "was present at the taking of the fort of Dewanpore, a place of some importance, and did good service there." The only letters written by my father which I have been able to recover belong to this period. In one of them he refers to his art as a cook. It is perhaps worth mentioning that he left behind him at his death a collection of carefully written recipes which would lead one to suppose that he had at one time intended to perform for Indian cooks a service similar to the one which he has rendered for Indian gardeners.

One only event in my father's Indian career remains to be recorded. It was on his return from a visit to Gowhatti that Bishop Cotton, in going on board the river steamer at Khustia, lost his footing and met with his tragic death.

In 1868 (January 9), Firminger retired from the service, and made his home at Warren Lodge, Edmonton, where the four youngest of his seven children were born. I was but a boy of fourteen at his death, but still I can well remember the care and self-denial which he expended on the education of his children. Amid all his varied pursuits, he had never, allowed his scholarship to "grow rusty," and on his writing-table, we found after his death that just a few hours before his last sudden sickness, he had been poring over a Greek play, and by side of the play were neatly arranged a file of papers covered with algebraic problems in astronomy, and some neatly painted geological charts.

During the remaining years of his life, Firminger lived very much to himself. Occasionally his old friends would visit him, but he himself, with the exception of a few months spent on a painting expedition in company with his eldest daughter in North Wales, was scarcely one week away from home. His days began early : even in winter time, before it was light, he would be out working in his beloved garden. Time for painting, music, and light reading, as well as advanced work in several sciences, was never wanting. He very seldom performed any ecclesiastical duties in the Paris church itself, but was always ready to give assistance with the services in the workhouse chapel and other such humble places. He belonged to no church party, so far as it is possible for anyone to live outside the currents of modern movements. He would, I think, have appreciated the solid work and personalities of such men as Smythies, Lowder, Dolling, or Stanton. His belief was in a God of Truth and Beauty : and everything which bore the stamp of truth and beauty was honoured by him as God's good creation.

My father lived to see his eldest son in Holy Orders. His death came very suddenly. Early in January, 1884, he went up to London and called on an old friend. He spoke very clearly to his friend about his death, which he instinctly felt to be close at hand. On January the 15th, he was taken ill, and on the 18th he passed peacefully to his rest. He was buried in the grave where the bodies of his father and mother are resting, in the churchyard of All Saints', Edmonton.

KIDDERPORE VICARAGE, WALTER KELLY FIRMINGER.
Calcutta, 1904.

A
MANUAL OF GARDENING
FOR INDIA.

INTRODUCTION

THERE is in India at the present moment a widespread and increasing interest in gardens. Those who possess broad acres spare no pains in decorating them, and those who possess but a small piece of ground must have their ornamental garden, their fruit and vegetable plots. The continued impact of the garden-loving outside world has doubtless had something to do with this revival of the ancient and honourable desire to plant and beautify the spot where one dwells. In Firminger's original introduction he gives a rather gloomy picture of the flower and fruit cultivation of that period. Generalities are always untrue and the present editor is by no means inclined to state that all over India nothing but the best is grown in the best possible way. The fact remains, however, that Europeans and Indians, princes and commoners, do take an interest in their gardens.

Of this fact there are many manifestations.

The literature of Indian gardening has, since Firminger's time, greatly increased in quantity and quality. We have for example, among recent publications, Villiers Stuart's "Gardens of the Great Mughals," Macmillan's "Handbook of Tropical Gardening and Planting," and Patwardhan's "A Guide to Rose Culture" (in English and Marathi). A bibliography (by no means complete) containing, among others, several works on Indian Gardening is given later in this book.

There has been an increase in the amount of seeds and plants sold in this country. In most large towns there are several firms who do a profitable business in seeds and plants. The world-famous firm of Sutton & Sons, Reading, England, have now established a branch in Calcutta. It is, therefore, obvious that there is a demand for the commodities supplied by these firms.

The seed sold is nearly all imported, and few of the ornamental plants sold are indigenous. There lie before the enterprising horticulturist two promising lines of development: (*i*) the production, on a commercial scale, of seed in India; and (*ii*) the taking into garden cultivation and production of new races of wild plants indigenous to the country. When one considers such brilliant and graceful plants as *Ipomœa coccinea* and *Gloriosa superba*, one feels that it would be worth while to domesticate them thoroughly.

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There is a moderate but increasing demand for trained gardeners and garden superintendents,—literate, scientifically trained men who can make gardens look well and pay handsomely. The mālee proper appears nowadays to be an unskilled labourer who has picked up some smattering of garden knowledge, but who has not the energy nor the ability to do much alone. The comparatively high wages obtainable by unskilled labour in industrial concerns have attracted many who at other times would have turned to garden work. The result is that the wages of mālees have risen, but the standard of their attainments has not improved. If anything is to be done with a big garden expert direction is needed, and men who have the necessary training can find employment thus. The demand for trained supervisors has led to a demand for the necessary training. This is now given at various public gardens and as a part of one of the courses of the Poona College of Agriculture.

There have sprung up, in most large centres, local horticultural-societies, some of which (e.g., that at Quetta) have done excellent work in instructing their members and the public how plants should be grown, and in holding shows.

There is a healthier idea abroad as to what is wanted in a garden. In Firminger's time there was a tendency to attach an undue value to rare plants. We now want a fair range of ornamental and useful plants, cultivated in the best way for the best effect, not a selection of plants that are merely rare.

The advent of the town-planning idea has brought with it the idea of garden and tree cultivation on a large scale with relation to roads and dwellings. The stimulus of these ideas has resulted in the artistic laying-out of newly planned areas for the accommodation of growing populations in such places as Salsette near Bombay.

Horticulture is coming to its own in India. Its basis, however, must always be a personal love and understanding of plants and the ability to do garden work one's self. In this connection and in conclusion Firminger's own admirable words are worth quoting:—

"No one should allow himself to suppose that he can have a well-kept, well-cultivated garden without being, to a considerable extent, his own head gardener. A garden left entirely in the hands of a mālee will invariably be found in that dirty, neglected state so noticeable in the compounds around most European residences in India. It is useless to give only general orders to a native servant. The owner must, from time to time, scrutinize each particular operation of the garden, and give special directions how it is to be done, or, in many instances, it will not be done properly, if even it is done at all. Vexation and angry words will never set things right. The malees are generally very good servants if properly managed; but more must not be expected from them than really is in their nature. They follow gardening as their vocation, but they have no enthusiasm for it; and the interest they take in the work will always be just in proportion to the interest they see taken in it by their master. And they will become interested when they find that a master is so; when he pays them regularly, refrains from maltreating them or giving them abuse, co-operates with them, and shows them, now and then, with his own hands, what he wishes to have done. Let them see that you are their master in respect of knowing and being able to perform their work as well as, or better than, themselves, and you will find in them as good servants as are to be met with, perhaps, in any part of the world."

PART I.

THE OPERATIONS OF GARDENING

CHAPTER I.

CLIMATE AND SOILS.

CLIMATE.

WHEN we speak of the climate of a place, we mean the sum-total of its characteristic conditions of heat, light, moisture, barometric pressure, precipitation, and atmospheric movement. These factors may be combined in a variety of ways, producing many different kinds of climate. Thus we may have a climate which is marked by scanty rainfall, intense cold at one time of the year, and intense heat at another, as in parts of the Punjab. Another climate may have as its characteristics a heavy rainfall concentrated at one season with a fairly equable temperature all the year, as in the Konkan. In the Peninsula of India we have such a variety of climates that at first sight it appears impossible to give any advice on the growing of plants that will be applicable to all India. The difficulty can be met by considering the main types of climate found in India and giving general directions for each type of climate. It should, however, always be understood that the man on the spot must exercise his commonsense and depart from or modify the procedure suggested as his local experience recommends.

Previous horticultural writers have tended to divide India into two parts—the "Hills" and the "Plains" and to prescribe for such a division. In the present edition this division has been, to a great extent, retained. A more logical classification would, however be, according to rainfall, e.g.:

Class	1.	Place	with	rainfall	above		100	inches	per	annum.
,,	2.	,,	,,	,,	from		70—100	,,	,,	,,
,,	3.	,,	,,	,,	,,		50— 70	,,	,,	,,
,,	4.	,,	,,	,,	,,		30— 50	,,	,,	,,
,,	5.	,,	,,	..	below		30	,,	,,	,,

To classes 1 and 2 belong the areas near the head of the Bay of Bengal and the whole of the west coast of the Peninsula, south of Bombay. To class 3 belongs a great part of Bengal and Behar. Class 4 comprises an enormous area including parts of Madras, the

Central Provinces, Central India, the United Provinces, and Bombay. Class 5 is represented by a large part of the Deccan and the whole of North-West India, including Sind, Rajputana, the Punjab, the North-West Frontier Province, and Baluchistan. In each of these areas there are hill stations and places in the plains, differing in temperature, light, and winds.

Taking India as a whole we may say that there are two seasons—the rainy season and the dry season. The latter may be sub-divided into the cold season and the hot season. The occurrence of a definite rainy season is due to the south-west monsoon wind which blows steadily during the summer months and deposits on the thirsty land the moisture which it brings from the sea. This is a season of great vegetative growth. Places which during May are mere burned-up prairies become in June sheets of living green, and leafless trees don their foliage. Plants behave variously in the cold weather and the hot weather, but in the latter the reproductive function of many forest and garden trees is called into activity. Then blossom the gold mohur, the Flame of the Forest, the teak, and many others, and the fruits then formed may ripen quickly or take many months to reach maturity. It should be mentioned, too, that, contrary to expectation several trees, such as the banyan, put forth fresh leaves in the hot weather. The heat is in some cases apparently a stimulant to vegetative as well as to reproductive growth.

The effect of climate on wild vegetation is clearly seen where extreme conditions prevail. As one travels from Karachi to Quetta by the North-Western Railway, one passes, in the neighbourhood of Bellput, through an area of great drought. For miles the only plant visible is *Capparis aphylla*, a hard, leafless spiny shrub. On the other hand, in Kanara, where there is a heavy rainfall and a constantly humid atmosphere there exists a magnificent tropical forest including enormous trees through whose leaves thousands of gallons of water in the form of vapour pass off into the air. The ranifall determines that in the first case the plants shall be few, with small evaporating surface, and in the other that they shall be many and with abundant leaf surface.

The action of temperature is to determine what species with these main characters shall occupy the ground. There are many places in the world with similar rainfalls but different temperatures. Districts with similar rainfalls have, on the whole, the same general type of vegetation, but the actual plants composing it are different. Thus numerous Indian plants will not stand frost and this strictly limits their distribution, even although the conditions of moisture outside these limits are suitable to the plant. We have the power to give artificial watering and so cause our garden plants to grow even in rainless districts, but we cannot change either the general humidity of the atmosphere or its temperature, unless we confine the atmosphere is a glasshouse, thus creating an artificial climate, as in the palm

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houses at Kew. A combination of great atmospheric humidity and great heat causes luxuriant plant growth. It is a *forcing* climate. We take the hint and arrange for the propagation of plants by cuttings at the break of the rains when the soil and air are still warm and the necessary moisture is present. A dry heat, as we have seen, tends to stimulate the production of flowers and fruit, and we arrange the treatment of our fruit trees accordingly. Short-season plants from colder climates, such as English vegetables, must have a cool season for their growth; hence we sow them when the cold weather begins. All this is merely the application of science to practice, a process of daily occurrence in horticulture. Here one may be permitted to remark, in passing, that unless science and practice go hand in hand, both suffer. The mere "theorist" and the mere "practical man" are equally futile. The best gardeners are scientists without knowing it. They observe, reason, and test their conclusions by trial in their daily work. This is science with practice.

It has been mentioned above that we cannot, except in a glass-house, alter the humidity or temperature of the air, but we can and must, in many cases, check or turn aside its movement. To protect plants from drying hot winds, freezing cold winds, or violent wet winds, belts of plants known as windbreaks can be planted. These are dealt with later.

Increase in altitude results in decrease of tmeperature and increase of light intensity. In hill stations it is often possible to grow European plants to perfection, and the colours are usually much more brilliant than those of the same species when grown at lower elevations. This is believed to be due to the greater light intensity.

No treatment of climate would be complete without some reference to the acclimatization of plants, *i.e.*, the adaptation of a plant to a new climate. Some of the commonest weeds now in India, e.g., *Flaveria contrayerba* and *Argemone mexicana* (the Maxican poppy) are accidental introductions from America which have had no difficulty in becoming acclimatized. Similarly, in Baluchistan, English and American willows are now established. In both cases the plants came from a like climate. Difficulty arises when we try to make a plant accustomed to a climate other than that which is natural to it. Thus pines which grow so magnificently in the Himalaya *can* be grown in Mahableshwar, but they are sickly stunted things, and it is unlikely they will ever establish themselves there. On the other hand, the banana, which with its broad leaf and large giving-out of water-vapour is most accustomed to a damp sea-coast or forest climate, can be acclimatized to dry hot conditions, provided irrigation is plentiful. It is always worth while trying to acclimatize a new plant in a similar or nearly similar climate.

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Firminger's own remarks on the subject of climate are as follows:

"In Bengal, what is called the 'Cold-season', lasts at the longest, not more than three months, commencing in November and ending by February. The temperature at night, during that period, at times, will fall as low as the freezing point ; but this is of rare occurrence. Towards the close of February commences the Hot-season, which lasts till about the middle of June, when the periodical rains usually set in. From March to May is the hottest period of the whole year. March and April are the driest months. Some time in June the Rainy-season begins, and lasts usually till about the 20th of October. The greatest humidity prevails in August and September. During these months, towards the evening, the atmosphere is filled with vapour almost to saturation.

The judicious gardener will, of course, conduct his operations in strictest reference to all these conditions of the climate.

During the cold months he will shelter his more delicate plants—those especially natives of a lower latitude—from the rapid transitions from heat to cold, and from cold to heat, which take place at this period of the year, hurtful alike to plant and man. To plants, likewise, that he sees have ceased from growth, and have entered into a state of temporary rest during these months, he will be most sparing in the application of water, which in that condition, they cannot absorb and assimilate.

During the arid months, that follow, when the soil becomes daily drier and harder, he will be liberal in his supply of water and surface-dressing to plants that, at that period, are in the full vigour of their growth, and especially to fruit-trees upon which the fruit is swelling.

When the rains are thoroughly set in and the air all but saturated with moisture, he will know that the season has come when plants, natives of this country, or of the same or lower latitude, may most safely be transplanted, as little evaporation then takes place from their leaves to exhaust them. For this reason also he will find it to be the time when plants of the same description may, with the greatest facility, be multiplied by cuttings, the soil itself being to them then as a hot-bed, and the dense body of moisture above acting as a hand-glass.

Again, at this season of the year, he will not be long in discovering, that to many of his more delicate plants nothing can be more fatal than alternate exposure to the violence of the rains and the fierce hot sunshine, that at intervals succeed each other then. With regard also to plants in the border, that are natives of a colder climate and that are in less vigorous growth at that period, he will also observe, in most instances, it is not the quantity of water that falls upon them in the way of rain, that is so injurious, but that which is allowed to lie and stagnate at their roots. For such plants, he will find a place in some gently elevated piece of ground whence the water may be gradually carried off not long after it has fallen.

It is at this season, too. that he will find the greatest difficulty in the management of his potted plants, particularly the choice kinds that require the shelter of a verandah. Many of these, though not making growth. cannot dispense altogether with some amount of moisture in the soil ; and of the water. applied from time to time for the purpose of insuring this necessary amonut of moisture, that which does not pass off by drainage has, except in the most airy situations, a tendency to stagnate, insomuch as to cause the soil to turn sour and become covered with a rank, green mould. to the great detriment and often death of the plants.

Towards the close of October, therefore, the gardener will be well aware that the time for him to be busiest has arrived. It is then that he will have to make his sowing of European annuals, and to put his kitchen-garden in forwardness for his crops of vegetables ; and to re-pot and make preparations for propagating his choice plants, natives of a colder climate.

The climate of the Upper Provinces varies considerably from that of Bengal, insomuch that many plants, which thrive under the one, will not thrive nor hardly exist in the other ; and possibly it has often happened that plants, introduced into Calcutta, and condemned from their not thriving there, as unsuited to India, might prove most valuable acquisitions in the United Provinces or the Punjab. Plants from a lower latitude. such as the Straits. for instance, that do not succeed in Calcutta, it is unreasonable to suppose would succeed higher up : but many plants from localities, such as some parts of China and the Cape of Good Hope, where they are subject to a season of severer cold than they find at Calcutta, there is every encouragement to make trial of in Upper India.

The Cold-season in Upper India commences at the beginning of October and cannot be said to be completely over till about the close of April. In December and January, sharp frosts at night are not infrequent, sufficiently severe to destroy, not only of the tender kinds of shrubs, but others of hardier growth, unless protected. The European annuals, though often in the early morning rigid with a white coating of hoar-frost upon them, and in an hour or so afterwards exposed to the burning rays of the sun full upon them, seem, with one or two exceptions, to take little harm otherwise than that their growth is all but entirely arrested while the season is at the coldest. By the 10th February the frosts are generally over.

During March, after their temporary rest, trees and shrubs in a well-irrigated garden push forth with a vigour perfectly astonishing far beyond anything of the kind ever witnessed in Bengal. The young shoots, however, thus rapidly produced, are very apt to be scorched up and killed in a few hours' time by the fierce hot gales that prevail soon after.

In May, the heat becomes intense, the same at night as during the day. At this period the garden must be unremittingly watered. Many plants in the border left unwatered even for a week would, of a certainty, perish, and most would be sure of dying, if left unwatered during the whole of the dry season. This excessive heat continues with little intermission, unless during the heavy falls of rain that occur more or less in July and August, till September, when it begins gradually to abate.

After the rains, furious winds frequently spring up, uprooting large shrubs and fruit-trees from the soil, while sodden with wet, and soft and loose. There is nothing that happens throughout the whole year so pernicious to the garden as this, and the evil of which it is most difficult to counteract or remedy."

SOILS.

Since soil is the material in which the gardener grows his plants, it follows that in a manual of gardening something must be said about soil.

In many parts of the Deccan we see patches of rock projecting through the soil. If we examine such a patch we find that it has a certain amount of vegetation on it, living mainly in cracks. We also find that there is a gritty powder on the surface formed by the breaking down of the rock. The rain, the sun, and the gases of the atmosphere slowly disintegrate all rocks. Plants help in the process of disintegration. In time the plants die and add their bodies to the general mass of material on the rock surface. Thus there arises soil, composed of disintegrated rock and dead plant remains. Animal matter may be present in the shape of dung, bones, dead insects, etc. The vegetable and animal matter is known *as humus*, and is essential to a fertile soil.

Soil has three functions for the plant :—

(1) It is the substratum in which the plant is fixed.

(2) It supplies water to the roots.

(3) It supplies, dissolved in this water, the chemical elements necessary for plant life, with the exception of carbon, which comes from the air in the form of carbonic acid gas (carbon dioxide).

The chemical elements necessary for plant life are (1) Carbon, (2) Nitrogen, (3) Hydrogen, (4) Oxygen, (5) Potash, (6) Phosphorus, (7) Sulphur, (8) Calcium, (9) Sodium, (10) Iron, (11) Chlorine, (12) Aluminium, (13) Silicon, (14) Manganese, (15) Magnesium. Of these hydrogen and oxygen are supplied by water, carbon comes from the air, and all the rest from the soil in the form of soluble salts dissolved in the soil water.

Referring once again to the above-mentioned three functions of the soil, it follows that soil—

(1) Must be compact and firm, not liable to slip or to be eroded ;

(2) Must have a capacity to hold water and also be ready to give it up to the plant roots ;

(3) Must contain the chemical elements necessary.

Plants make the severest drain on the elements (2), (5), and (6) and it is these which must be replaced in the soil by manures. Of the other elements there is usually abundance in every soil, although occasional examples are met of soils deficient in calcium.

Again referring to the above three points, it must be stated that—

(1) Excessive compactness of the soil is harmful on account of the lack of air in it ;

(2) and the same holds good of water-holding capacity.

(3) Excess of any one element usually has disastrous effects on the plant.

The ideal soil, therefore, has a texture neither too fine nor too coarse, with a fair water-holding capacity and plenty of aeration, and is rich in all the elements necessary for plant life.

Texture is largely a matter of the size of particles of which the soil is composed. The following classification adopted by the Bureau of Soils of the U. S. A. Department of Agriculture is as useful as any :—

Size of particles.		*Name of soil.*
2·0 to 1·0	millimetres.	Fine gravel.
1·0 to 0·5	,,	Coarse sand.
0·5 to 0·25	,,	Medium sand.
0·25 to 0·10	,,	Fine sand.
0·10 to 0·05	,,	Very fine sand
0·05 to 0·005	,,	Silt.
0·006 and below	,,	Clay.

The smaller the particles of the soil the more does it refuse to give up its water. Fine particled soils are also apt to crack badly in the hot weather and contain little air. Coarse soils retain little water and never crack, but are blown about as a powder.

The great advantage of humus in a soil, in addition to its power of producing nitrogen, is that it loosens stiff soils and binds loose ones and generally improves the texture of the soil. A good mixture of soil particles of varied size, plus humus, is known as a loam.

Some soils are so dry that they must be irrigated. Similarly some soils are so wet that they must be drained. Both are attempts

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to adjust the water-content of the soil. Too much water is as bad as too little.

The types of soil found in India are many and varied. On the sea-coast we get sandy soils. In river areas we get silts. In old well-cultivated areas, not in river regions, we get loams. Soils containing a large amount of clay, such as black cotton soil, crack badly, and soils defective in humus, like the soils of Baluchistan, set hard as iron. In many parts of India (e.g., in Sind, the Punjab, and the United Provinces) are found soils containing a large percentage of salt, sometimes appearing as a white deposit on the surface of the ground. Each soil must be dealt with so as to remedy its defects. The sand and the clay must have more humus added. The good loams need the best possible tillage and cultivation. Salt soils must be treated so as to wash the salt out, and also require large quantities of bulky manure. As Firminger remarked in his third edition :

> "Too much importance cannot be attached, however, to the thorough working of even good soils. It is by the minute inter-mixture of the smallest particles that chemical action is set up without which there can be no real substance for the plant. With suitable ingredients, a good soil should also be mellow and sweet. Stagnant water (especially near the surface) not only impedes the latter quality, but produces a sourness which soon becomes highly injurious to the roots of plants. It is for this reason that retentive soils need to be well drained."

MANURES.

As has been already mentioned the use of manure is to supply the chemical elements removed from the soil by the growth of plants. In addition, certain manures improve the texture of the soil.

We may classify manures as follows :—

(1) Those supplying mainly nitrogen—cow-dung, horse-dung, sheep-dung, goat-dung, leaf-mould, green-manure, oil-cake, night-soil, nitrate of soda, ammonium sulphate, calcium cyanamide ;

(2) Those supplying mainly phosphorus—bones, calcium super phosphate, fish ;

(3) Those supplying mainly potash—ashes, sulphate of potash.

A complete manure must contain nitrogen, phosphorus, and potash. and hence a mixture of manures from the above three groups is recommended.

Cow-dung is the oldest and best general manure. In India it is largely burned for fuel and valuable nitrogen thereby wasted. It contains from ·05 to 1 per cent of nitrogen in a gradually available form. It also contains about 0·3 per cent of potash, and 0·3 per

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cent of phosphoric acid. Horse-dung is somewhat less rich in these elements, and sheep and goat dungs are richer. These remarks apply to the solid dung only. The urine of these animals is also rich in the elements required by plants and hence the bedding of stables and byres where urine has fallen, mixed with the solid dung, is an excellent manure. Farmyard manure of this type is best after it has been allowed to remain for a little while in a pit, occasionally forked over to aerate it and protected from rain. Recently (about 1922) a method of producing *artificial farmyard manure* has been devised in England. The raw material is straw. When this is moistened, and also watered with an alkaline solution containing nitrogen, and is then stored in well-aerated heaps, it ferments, and in about three months (in England) becomes a mass of excellent manure resembling farmyard manure in all its qualities. Three-quarters of a cwt. of sulphate of ammonia and one cwt. of finely divided carbonate of lime per ton of straw have been recommended as the source of nitrogen for this process. It is worth trying on straw and litter of all sorts in India.

Oil-cakes contain from 4 to 6 per cent nitrogen, and are therefore fairly concentrated manures. They also are slow-acting.

Fish scrap in addition to its 3 per cent phosphorus, contains also 4 per cent nitrogen and is a quick-acting manure.

Bone meal contains on the average 22 per cent phosphoric acid and 3·5 per cent nitrogen and is slow-acting.

Nitrate of soda, ammonium sulphate, sulphate of potash, and calcium superphosphate all being easily soluble are quick-acting.

Ammonium sulphate and nitrate of soda are now easily available in India. They can be applied as stimulants to grass, flowers, and pot plants. A useful programme (using either fertiliser) is to start with a solution of half an ounce of fertiliser to one gallon of water, and give a weekly dose at the rate of one gallon solution to 10 square yards of lawn, or to 3 square yards of flower-bed, or to 10 pots. The strength of the solution should gradually be increased to 2 oz. per gallon.

Ashes contain from 5 to 10 per cent potash and are quick-acting.

The function of nitrogen is to increase vegetative growth. Excess of nitrogen means plenty of wood and leaves and little flower or fruit.

Phosphorus hastens maturity and assists the ripening of fruits.

Potash is essential to the plant for the proper manufacture of its carbon-compounds, starch, sugar, and cellulose.

Green manure is formed by growing a crop on the land, preferably a leguminous crop, and ploughing it in so that it rots in the soil and adds its substance thereto. Leguminous crops are preferred because by means of the bacteria that inhabit the nodules on their

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roots, they can fix and assimilate the nitrogen of the atmosphere, and this additional nitrogen is handed over to the soil when the plant is buried.

No mention of the soil would be complete without some reference to the bacterial life of the soil. The nitrogen in organic matter like dung and oil-cake is locked up and must be changed into nitrate before the plant can use it. The making available of this nitrogen is the work of at least three seats of soil becteria, the final product being a nitrate (often calcium nitrate), which the plant can assismilate. The storing of dung helps this process. For certain soils, especially those containing an excess of humus, lime is a valuable manure. It sweetens the soil. It has recently been discovered that when the first rains fall on the heated soils of India, there is a considerable increase in the amount of nitrogen in the soil. This may to some extent explain how in certain places crop after crop is taken with little manuring.

Salt is applied to certain special crops. The requirements of each crop will be dealt with in the portions of the book devoted to them.

The following notes from Firminger's third edition are of value :—

'LEAF-MOULD.—In most gardens of any size that have been long established there will always be a great quantity of vegetable refuse, particularly at the time when mangoes and other fruit-trees shed their leaves. All this should be collected and thrown into a deep pit, dug for the purpose in some out-of-the-way place. If two or three times during the hot-season water be supplied to the pit, so as to give its contents a thorough soaking, the decay of the vegetable matter will be all the more speedy. In about a year and a half from the time the pit is filled, all that has been thrown into it will have become decomposed, so as to supply invaluable material for gardening purposes, especially for potting. It need hardly be remarked, that it will be found to contain quantities of worms and other vermin which, of course, as far as possible, should be carefully removed before it is used for potting.'

On this subject the following remarks by the editor of *Gardeners' Chronicle* will be found of value : 'There are only two ways in which leaves, bits of stalk, or rotten wood, twigs, and similar refuse can be safely used :—

'1. One way is to leave them in a heap till they are thoroughly rotted down, then to sift them through a fine sieve, rejecting undecayed fragments, and again rotting down the siftings.

'2. The other is to char them. We do not mean to burn them, but to reduce them by heat and exclusion of air to the state of charcoal dust: a process by no means so easy as may be supposed, but to be carried out by any experienced gardener, after a few failures, which are sure to occur at first. And this is, in our opinion, by

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far the better method of the two. It is speedy, at once effectual, and destroys the eggs of every sort of insect. The former, on the other hand, is very slow, often the reverse of effectual, and does not possess one single advantage over charring.'

Leaf-mould is particularly good for the cultivation of ferns, palms, and such fine foliage plants as naturally grow under the shade of forests. Decomposed in a pit, as recommended above, it is infested by the larvæ of the rose weevil, etc., so that charring before use is very necessary.

CHARRED TURF.—An excellent material for general potting purposes may be obtained by charring turf. Any quantity of turf may be easily collected, in Bengal at least, from the roadsides or waste places. It should be laid out, exposed to the sun, with the green part undermost. In a few days it will become thoroughly dried, and in that condition may, in a very short time, be roasted sufficiently to be adapted for use. There are various ways in which the roasting may be managed. The plan I have adopted has been to prop a large earthenware vessel upon bricks, light a fire beneath it, and then throw in the turfs, pulled apart into pieces of moderate size ; take them out when sufficiently roasted, and throw in others.

Charred turf is said to be specially suitable in the cultivation of *Fuchsias* and *Azaleas*.

VEGETABLE OR WOOD ASHES.—'These,' says Dr. Lindley (quoting from 'Horticultural Transactions,' Vol. V, p. 52), 'are esteemed the very best manure by the Chinese. The weeds which are separated from the land by the harrow, with what they otherwise are able to collect, are carefully burnt, and the ashes spread. The part of the field where this has been done is easily perceived by the most careless observer. Indeed, the vigour of the productions of those parts of their land where the ashes have been applied is evident as long as the crop continues on the ground. The ashes of burnt vegetables are also mixed with a great variety of other matters in forming the compositions which are spread on the fields or applied to individual plants.' Garden refuse, however, may in general be turned to better account than by converting it absolutely to ashes.

OLD MORTAR.—This has come to be recognised as a very valuable aid in the cultivation of ferns, rock-work plants, and, in fact, for a very large number of potted plants. I have seen it used with great success in the Royal Botanical Garden, Seebpore, for all kinds of plants ; even for terrestrial orchids. I have tried it myself on a very large scale, and have found such plants as *Begonias*, *Cyrtodeiras Peperomas*, *Fittonias*, *Anthuriums*, *Dracænas*. *Alocasias Gesneras*, *Selaginellas*, *Ferns*, and a host of others, thrive to perfection in soil, three parts of which was composed of this old mortar, or concrete. For rockeries I know of nothing better. It can, moreover, be easily procured. The roofs of old *pucca* houses, when knocked down, afford the best material—the older the better. I strongly recommend the extensive use of old mortar or concrete for potted plants generally. When used for small plants in small sized pots, it should be broken into pieces, the size of hazel-nuts or smaller ; when for large plants in large pots, in pieces the size of walnuts smaller or larger to suit requirements. Coarsely pounded and added to the soil, it keeps it from getting sodden and sour, by effecting good drainage. The tender roots delight in attaching themselves to pieces of this concrete, from which they obtain much nourishment.

LIQUID MANURES

"Liquid manure should be applied to plants only when in a vigorous state of growth. All plants are benefited by it if administered judiciously, that is to say, not in excess. The copious use of it with culinary vegetables, but more particularly with Celery and Asparagus, I have found of wonderful efficacy. The most convenient way, perhaps, of keeping a supply of liquid manure, for kitchen-garden use is, somewhere handy, to sink in the ground a large earthen vessel ; fill this with water, and throw in all such ingredients as happen to be available for the purpose, such as fowls', pigeons', goats', bullocks' dung, etc. If found to be too strong, it is easily reduced by adding water at discretion. Dr. Lindley's maxim, in the application of liquid manure, is that it should be 'weak, clear, and often.' This rule should never be departed from. The great advantage of liquid manure over solid is, that it is stronger, quicker of action, and can be more evenly diffused over the land. It is for these advantages that sewage is so highly prized for market gardening. But manure in the liquid form is most profitably applied to composts, where it comes into contact with organic matter and causes healthy fermentation—otherwise the rapid formation of plant food.

SOAP-SUDS.—'These', says Dr. Lindley, 'have an undoubted value, because of their potash, irrespective of the animal matter they contain. Upon Cabbages, Cauliflowers and all the Brassicaceous race, they produce an immediate and very advantageous effect.'

Large quantities of soap-suds are daily thrown away from nearly all houses which, with very little trouble, might be made use of most advantageously for the kitchen and flower garden. When not required for any other purpose, they might be poured into the pit containing garden refuse, stored up for vegetable mould, which would be greatly enriched thereby.

For potted plants they are invaluable, and I scarcely know of a better and more effective insecticide. By syringing and washing the leaves of potted plants with soap-suds, I have preserved them from the attacks of blight, mealy-bug, red spider, and other enemies of the gardener. Plants in a sickly condition have often been restored to health by merely washing their leaves with soap-suds. The effect of washing Geranium leaves with suds is simply astonishing. In fact, if you wish to keep your potted plants in luxuriant growth, wash and syringe them with soap-suds once or twice a week, especially those exposed to dust."

COMPOST.

"A compost is a mixture of dung and earth with various other materials. It is kept moist in a pit for six weeks as a rule and then used. The earth absorbs the gases and salts produced by the other materials, and the mortar takes up nitric acid.

The following compost I have found the best for potted plants generally:—

Leaf mould, well decayed ..	2 parts.
Cow-dung, well decayed ..	2 ,,
Garden mould	2 ,,
Wood-ashes, sifted	1 ,,
River sand	1 ,,
Old mortar, or concrete ..	2 ,,

RULES OF MANURING

There are one or two simple rules to be observed in the application of manures :

(1) Never put raw manure of any kind in direct contact with the roots of a plant. Always mix it well with earth.
(2) It is better to manure little and often than much and seldom.
(3) For leafy growth add nitrogen, for flowers and fruit reduce nitrogen and increase phosphorus and potash.
(4) Do not apply easily soluble manures just before heavy rain.
(5) Apply other manures during the rains especially and at seasons when the tree is making growth.

CHAPTER II.

LAYING OUT OF A GARDEN—LAWNS—HEDGES—HOEING AND DIGGING—IRRIGATION—DRAINAGE—CONSERVATORIES—BETEL HOUSES—DECORATIONS—IMPLEMENTS—SHADES—LABELS—VERMIN—WEEDS.

THE LAYING OUT OF A GARDEN

THE manner in which a garden should be laid out will depend much upon the locality where it is situated, and on the judgment and taste of the owner. All that is proposed at present is to give merely a few practical directions.

The arrangement of a garden will be very much modified with reference to the source on which it depends for its supply of water. If, as in the greater part of India, the garden is to be irrigated by artificial means, the water must be obtained from a well, a tank, or a river.

Where the water is supplied from a well, it is important that the well be situated where the water may have the readiest access to all parts of the garden, and where also it may be most easily screened from view by shrubs and trees planted around it. As native servants, moreover, have continually to be going to the well both for performing their ablutions there, and for drawing water for domestic purposes, there should be a pathway to it made for them exclusively, cut off entirely from the rest of the gardens by means of a hedge. This is desirable, not only for the purpose of keeping the garden as much as possible secluded, but also for the safety of its produce.

The footpaths should be raised six inches above the level of the borders, and the water from the well is conveyed along each side of them by channels, also a little above the level of the border. Where paths intersect, the water is carried underneath the paths by pipes. In these water-channels shrubs and trees may be always planted.

Where a more suitable material is not available, the paths and the embankments of the channels must be made of common garden soil, well beaten down by wooden rammers. These, after the heavy rains in August and September, become always so much damaged and broken up as to require to be remade at the commencement of each cold season. Here it is necessary to call attention to a point of very great importance.

It is the almost invariable customs to make the pathways just about a quarter of the width that for convenience they ought to be ;

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in consequence of which the trees, when arrived at even a moderate size, overgrow the pathways so entirely as to render them impassable. To remedy this the boughs are usually lopped away, but of course, to the very serious injury of the trees. This mistake of making the paths too narrow should be guarded against when the garden is first laid out. The eye is, at that time, very apt to be deceived, and paths made then as broad as they should be will seem to most persons perhaps extravagantly and unnecessarily broad. The growth. however, of the trees on each side will in two or three years' time show the paths to be of the right width.

In a garden large enough to admit of it, it is highly desirable that there should be one wide shady path, where persons in conversation may be able to walk two or three abreast. A pathway of this description might not unreasonably be made from twelve to even sixteen feet wide. The best situation for it would be by the wall of the garden, where high shrubs or trees are planted to keep the premises from being overlooked. A pathway of such great width would in reality be attended with no loss of space, as it would extend only over ground occupied by the roots of the trees along the wall side, thus rendered useless for other purposes. The ordinary paths of the garden, by the sides of which low shrubs and trees are grown. need not, of course, be so wide, and indeed for variety's sake, would be more pleasing if narrower ; but not less than eight feet wide.

In the gardens of Lower Bengal, where irrigation by water-channels is not adopted, fruit-trees are cultivated in a detached piece of ground, and no large trees or shrubs are planted near the edge of the pathway. In such case the width of the plants is of not so much importance. But still no garden of any size will present a handsome general appearance unless it has, at least, one wide spacious walk throughout its principal extent, from which paths of smaller width are made to strike out and ramify.

In Bengal the paths are usually made with a foundation of broken bricks, over which a layer of khoâ, or bricks broken into pieces of the size of a walnut, is spread. Over the whole a coating of soorkee or brick-dust is then laid, and well beaten in, till the surface is perfectly level and smooth.

In Calcutta and places were there are gas-works, and where coal is largely consumed, coal ashes or cinders will be found very good for laying over paths. This has been used in Calcutta, and found better than anything else in keeping the paths from becoming slippery and dangerous to walk upon during the rains. Where procurable, red gravel, known in the vernacular as *buiree*, should invariably be used. When good gravel is procurable there is nothing to beat it. Throughout Southern India it is the chief material for making garden

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roads and paths. Laterite should be laid down where there is much wheel traffic.

In the Deccan the practice is to lay a foundation of large stones, add a layer of road-metal, and finish up with *murum* (disintegrated trap). Gravel is spread on top of this, and the whole looks and wears well.

In planting out flowering shrubs, trees or creepers, one thing of essential importance is, that the situation selected for them in the border be where their sunny side is most presented to the sight; for it may be often witnessed that, while the southern side of a plant, is loaded with a profusion of blossom, the northern side, shaded from the ripening influence of the sun's rays, remains unadored with a single flower. This is frequently very conspicuous in the case of *Millingtonia hortensis* and more especially of that magnificent creeper *Bignonia venusta.* If sweet-peas, likewise, are grown on the southern side of a path, the flowers they put forth are completely lost to view. The same thing is true also of sunflowers and nasturtiums.

The modern plan of laying out small separate beds for groups of particular species of annuals is a very beautiful and effective one; and where the garden admits of it, a portion of ground near the dwelling-house may be well devoted to this purpose. The disadvantage attending the plan in Europe is, that during the long period of the winter months the beds remain bare and unsightly. But in this country such beds need never lie vacant, as when one class of annuals is over, another may be immediately brought to succeed in its place. During the cold months there will be the usual English annuals; during the hot months, *Petunias, Verbenas, Phlox, Salpiglossis, &c.,* will bloom beautifully; and during the rains these may be succeeded by *Balsams, Zinnias, Marlyma, Pentapetes, &c.*

In the formation of these small beds it would not be advisable, perhaps, to venture upon any figures besides merely the circular and

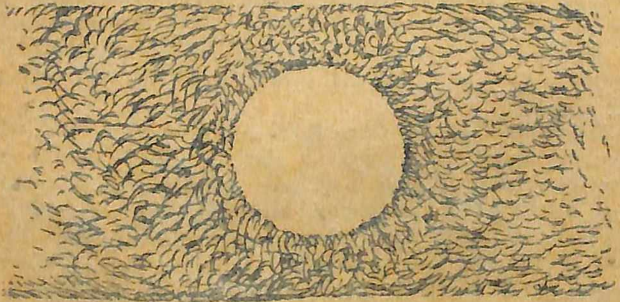

Fig. 1.

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oval. These are easily designed and always look well ; but many of the geometrical and contorted figures one frequently sees are, at the best, anything but pleasing, and when attempted by the rude skill of the mâlee would, in all probability, prove only ridiculous.

Examples of beds cut out in grass will be found in Figs. 1 and 2.

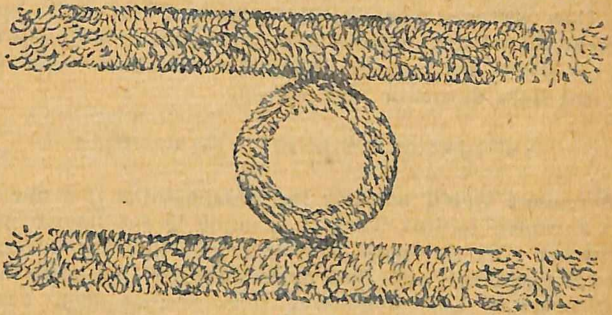

Fig. 2.

The foregoing remarks refer, of course, only to private gardens of limited extent ; but even here what is termed the "natural" style of laying out might be attempted with advantage. Nothing has a better effect than the grouping of plants in clumps according to their growth, colour of the flowers and leaves, and the contour of the ground. This style is beautifully exemplified in the Eden Gardens at Calcutta, and the "Ram Newas" Public Gardens at Jeypore, in Rajputana. Complicated geometrically-cut beds are not recommended to the average amateur gardener. In large public gardens they may be attempted with success. Winding paths, with clumps of shrubs planted at intervals at the bends and curves, have a very fine effect.

In the laying out of gardens of large extent, regard must be had to the surrounding scenery, and advantage should be taken of any vistas that may exist in the neighbourhood. In the case of large public gardens, it is a dereliction of duty in the person laying out such a garden if he omits to take advantage of the surrounding landscape. Landscape-gardeners do not abound in India, but any one having an eye for the beautiful, should have an eye for landscape-gardening. It must be borne in mind that the ultimate beauty and success of a garden will depend very much upon how it is designed and laid out in the first instance.

It is well to recollect that any garden is a piece of design,—a pattern intended to fill a given space. Much has been written regarding garden planning in recent years, and out of it all there emerges this broad fact ; that at different periods there have been crazes for different styles, but that beauty is above all styles. Thus certain gardeners even yet deny that a garden laid out in straight lines can

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have any beauty, and yet this is exactly how the famous old Mughal gardens were laid out. Some writers consider that a garden should either be entirely formal or entirely natural, but obviosuly there are situations in any garden where either formality or naturalness is the more suitable. Again, another fact emerges : that the general principles of design if applied with commonsense will give excellent results. Thus we must consider the proper filling of the space, the arrangement of colours, balance and symmetry, and finally the feeling that the whole will convey. *"Solvitur ambulando"* and it is only by trial that light dawns on this subject.

DESIGNS FOR THE FLOWER GARDEN.

Some readers would possibly feel disappointed if a few sketches were not included in this work as a guide to the laying out of the flower garden. At the same time it is felt that special conditions need special treatment, and that plans on paper are often most unsuitable in practice. As a general rule, flowers look best when massed together in beds of simple design like the square, oval, circle, and rectangle. A large circular bed forming a sloping mass of harmonising colour, from centre to margin, is always a pleasing sight ; and when surrounded by a well-kept lawn there can be nothing more charming. Other beds, having rounded or wavy margins, dotted irregularly about one or two sides of the lawn and flanked by a shrubbery and border, complete the free and easy style of garden which many people prefer to more elaborate designs.

On the other hand the compact geometrical garden economises space and lends itself to certain advantages of grouping which the gardener cannot always afford to relinquish. Perhaps the most interesting gardens are those which exhibit both styles in different situations. They should never be mixed. Beds having many points and angles should be avoided, as even the smallest and most compact growing plants are unable to adapt themselves to very limited nooks and corners. The only exception to this would be the star-shaped bed, which is so effective in carpet designs that it is worth the additional trouble to plant it carefully. Tall-growing plants such as the Hollyhock, Sunflower, Dahlia, Canna, and Zinnia, find a suitable position either in the centre of a large bed or at the back of a wide border. They also form suitable centres to wide borders having two faces. Large-growing plants should never be put near the outer margin of a bed.

In addition to the foregoing remarks, it is necessary to offer some advice as to the general treatment of an Indian compound. As everyone knows, the latter is often much neglected ; and is anything but a thing of beauty. The compound is usually a rectangular enclosure, varying in size from a few to many acres.

If comparatively large, the bungalow will probably stand well back from the street or road. In the city of Madras the compounds are often extensive and park-like. The owner of a large compound has one inestimable advantage, namely, space. The artistic value of space is clearly seen in the generously planned gardens round the Mughal palaces and tombs of Delhi and Agra. Comparing small things with great, we may take a lesson from the gardens, and turn a large untidy compound into an area of beauty, exploiting the space to grow trees, hedges and grass so as to give an effect of privacy and peace.

Every compound should possess a number of good trees—some being serviceable for necessary shade all the year round, and others for their fragrance and handsome flowers. Evergreen trees specially recommended for avenues and grouping, up to an elevation of 3,500 feet, are as follows:—

A,—INDIGENOUS TREES.

Tamarindus indica.
Saraca indica.
Artocarpus integrifolia.
Dalbergia Sissoo.
Mangifera indica.
Ficus Benjamina.
  ,, ,, var comosa.
  ,, retusa.
  ,, Tsiela.
Chickrassia tabularis.
Amoora Rohituka.
Gelonium lanceolatum.
Melia Azadirach.
Azadirachta indica.
Filicium decipiens.
Thespesia populnea.
Calophyllum inophyllum.
Ochrocarpus longifolius.
Pterospermum Heyneanum
Polyalthia longifolia.
Michelia champaca.

B.—INTRODUCED TREES.

Poinciana regia.
Kigelia pinnata.
Brassaia actinophylla.
Colvillea racemosa.
Parkia biglandulosa.
Cassia marginata.

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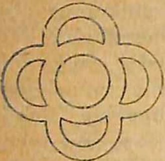
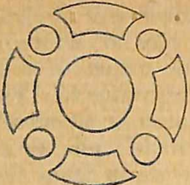
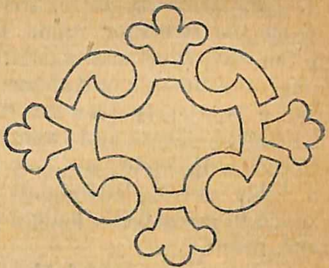


A



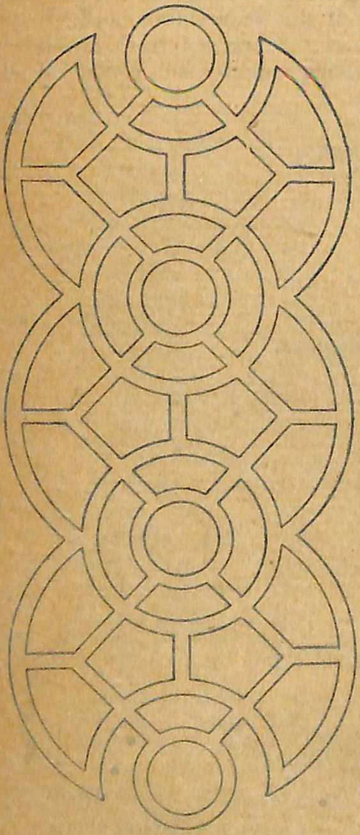
B

A and B are simple designs for cottage gardens.



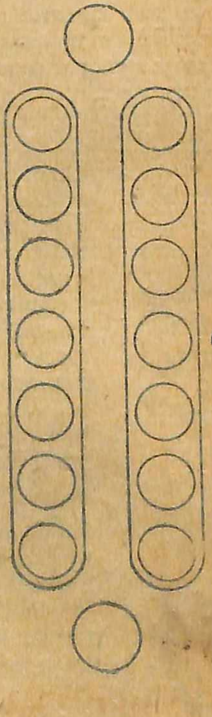
C

C has a pretty effect on gravel and may be repeated at some distance to form a larger garden. In the latter case, the intervening space between the groups of figures should consist of a lawn on which a fountain, vase, or handsome shrub should be placed.



E

E adapts itself to the massing of annuals in harmonising colours.



D

D indicate a simple design for carpet-beding on a central walk. Laid on gravel.

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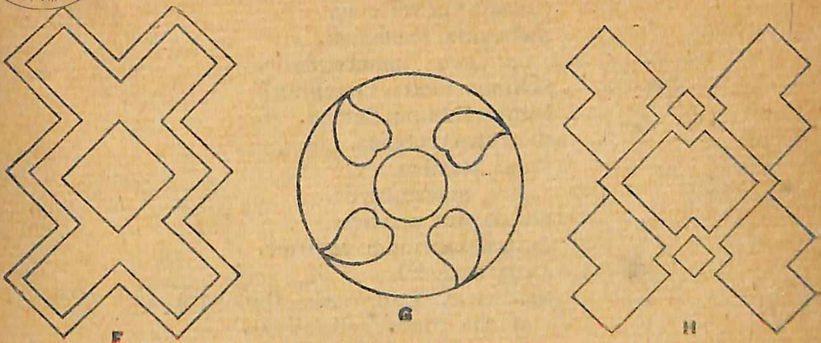
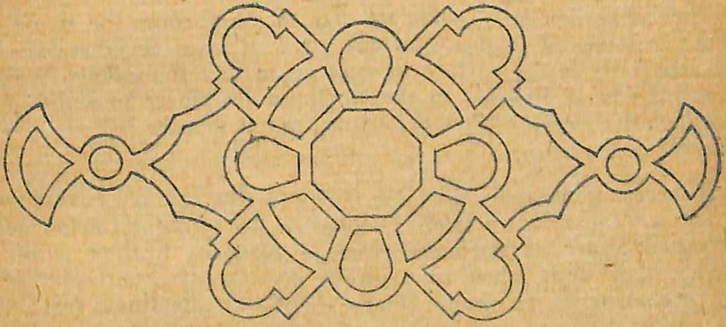
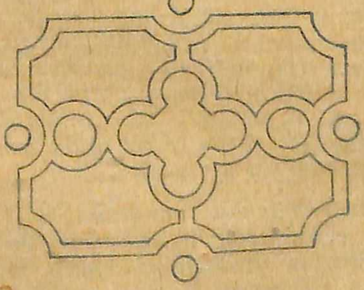


F, G and H are sectional designs for carpet-bedding.



I can either be a rosary or herbaceous garden.



J is a suitable figure to be used at the four corners of a rectangle.

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Cæsalpinia coriaria.
Swietenia Mahagoni.
„ macrophylla.
Schinus molle (weeping).
Pithecolobium Saman.
Grevillea robusta.
Ficus elastica.
„ macrophylla.
Eucalyptus species.
Castanospermum australe.
Anda Gomezii.
Araucaria, Cupressus, Dammara and Frenela.
at the higher elevations.

LAWNS.

When a garden is of sufficient size to allow room for it, nothing is more ornamental than a spacious piece of lawn or grass-pot; and more especially is the surface of cool green that it presents, soothing and refreshing to the eye in the Northern Provinces of India, when the soil of the country around during the hot months lies all parched and bare.

The grass principally used for lawns in this country is that called *doob*-grass. (*Cynodon dactylon*), known in the south as *Hariali* and in the United States as Bermuda grass, a plant of trailing habit, not growing high, and, when in vigorous growth, of a soft, dark-green hue. It thrives in an extraordinary variety of situations, from moist river banks to places where brick and lime rubbish has been thrown and trodden down hard and from the warm moist climate of Malabar to the rigorous conditions of Baluchistan. When required for lawns, a sufficient quantity may easily be collected from the roadside and waste places. The piece of ground intended for a lawn should be well dug, and then made perfectly level and smooth. Drills should then be drawn over it a foot apart, in which little pieces of the roots should be planted out at the distance of half a foot from each other; and the ground afterwards watered occasionally, till the grass has become thoroughly established. If possible, the lawn should be sprayed daily during the dry months, but, if this is out of the question, a good flooding once a week will keep the grass alive.

The weed, *Cyperus rotundus* (nut-grass), if it once appears in a lawn, can hardly be eradicated. To effectively destroy this and other weeds before planting the *doob*-grass, remove the top six inches of soil all over the plot and heat it for a day over a slow fire composed of all the available garden refuse. The soil must not be baked but must reach at least 60 degrees Centigrade. The tubers and seeds in such soils are killed. It is returned to the plot and the grass planted in it. Instead of heating the soil (which expedient may not be possible on account of the size of the lawn), weeds may be encouraged (so to speak) to come up by light waterings and then eradicated. In any case, time employed to clear the land of weeds *before* planting the grass is very well spent.

A more expeditious and very successful plan of laying down a lawn, sometimes adopted, is to pull up a quantity of grass by the roots, chop it tolerably fine, mix it well in a compost of mud of about the consistency of mortar, and spread this out thinly over the piece of ground where the lawn is required. In a few days the grass will spring up with great regularity over the plot.

Another method, adopted by the editor of the Fourth Edition with great success in the Jeypore Gardens, was to first select and level the ground intended for a lawn, and water it well, Then dig up the *doob*-grass in squares of about eight or nine inches from localities where it was found growing, with the earth adhering to the roots, and lay it down in the manner bricks are used for paving. Having done this, he took wooden mallets, and beat the squares with them until an uniform level surface was obtained. Very little after-care is necessary with this method, and lawns as level as billiard tables may be made. The lawns in the Jeypore Gardens were the admiration of all who saw them, and they were made by this method.

Recently, seed of *Cynodon dactylon* has been available from seed firms in India, and a very satisfactory lawn can be prepared by sowing this seed. The precautions regarding the eradication of weeds previous to planting are even more imperative where grass seed is used since the seed may be a little slow to germinate and if weeds are present they get a foothold first.

Doob lawns sometimes show patches of whitish-yellow grass. The cause of this is unknown. An application of ammonium sulphate improves, but does not quite remove, this condition.

In the Bombay Deccan it has been found advantageous to spread a layer of two inches of good soil on top of a lawn once a year in the hot weather just before the rains.

All that has been said of lawns applies to cricket pitches and golf greens. In the case of cricket pitches, a wicket-table holding at least four pitches should be prepared, for use in turn as the wear on a pitch is serious.

The fine turf found around the outer margins of tanks in Mysore, consisting of a few mixed grasses, forms a compact and easily-kept lawn. *Oxalis corniculata* gets into it but rather adds to the effect, and resembles clover in miniature.

Swampy ground and spots where water lies long after rain are not adapted for *doob*-grass. In such localities it soon perishes,

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and plants of ranker growth, such as *Cyperus rotundus*, *Saccharum spontaneum*, and *Imperata arundinacea* make their appearance. *Cyperus rotundus* is known as *mootho* in Bengal, and as *lavala* and *Nagarmotha* in the Deccan. *Imperata arundinacea* is known as *ooloo* and *Saccharum spontaneum* as *kash* in Bengal.

HEDGES.

A hedge is sometimes employed as a boundary to the garden instead of a wall, for which, however, it is not a very efficient substitute. Without constant attention it soon gets out of order; either looking unsightly from being over-grown with weeds, or rendered unserviceable from the formation of gaps.

One of the plants, more commonly grown than any other, perhaps, for a hedge is the *Agave*. This has a fine effect when used as a fence, if in vigorous growth and kept clear of weeds. It is perfectly impenetrable by cattle, and, from the lowness of its growth, in no way impedes free ventilation. There are five common species of Agave, (1) the short-leaved *Agave Wightii*, (2) the big blue-leaved *Agava Veracruz*, (3) the narrow green *Agave cantala*, (4) the broad green *Agave sisalana (sisal hemp)*, (5) the yellow-striped *Agave Americana*. They are propagated by suckers or bulbils.

Parkinsonia aculeata and *Cæsalpinia sepiaria*, shrubs armed with powerful thorns, have small-leaved foliage, and, when kept closely clipped, form neat impenetrable hedges.

When a wall is too low of itself to render the garden secure from depredation plants of the Nicker-tree (*Guilandina Bonducella*) trained upon it, render it at once an utterly impassable barrier. *Acacia Modesta*, a common shrub in Upper India called there *Phulaee*, forms also a very neat and pleasing hedge. *Sesbania, ægyptiaca (jait* or *sheori*) is very often employed also hedge in Upper India on account of the rapidity of its growth; but it is very unsuitable for the purpose, as, though rather neat and pretty the first season after it has been raised from seed, it becomes worn out and unsightly in a season or two afterward.

The *babul*, *Acacia Arabica*, and other species of thorny *Acacia* make excellent hedges. The seeds are hard and require soaking in strong sulphuric acid for six hours, or grinding with sharp gravel, before sowing. All hedges must be pruned low at first to induce thickness underneath.

Hedges that are required not so much for a fence as for separating one part of the garden from another, may be made successfully of nearly any kind of shrub of quick, ready growth, and of small delicate foliage. Even *Casuarina equisetifolia* cut down to the height of six feet, and kept constantly clipped, affords a close dense hedge of most agreeable, soothing character.

For a low, neat, fresh-looking hedge, perhaps no plant is better adapted than *Lawsonia alba* (*Menhdee*) or *Duranta Plumierii.* These are planted by cuttings which should be arranged in two rows a foot apart, with one foot from cutting to cutting in the rows and the cuttings of the second row coming opposite the blanks of the first row.

Dodonæ viscosa has been much sought for of late as a hedge plant; but it is no novelty. In the garden of Brigadier F. Young, at Ferozepore, it was employed for that purpose as long ago as 1846. But the excessive hardness of its wood turned the edge of a knife when the attempt was made to clip it, except when quite young, and it became a nuisance, from the profusion of seeds it shed upon the path. *Inga dulcis* also forms a fine hedge. Other plants which form pretty fences when neatly trimmed are *meyenia erecta, Hamelia patens, Plumbago zeylanica, Clerodendron inerme. Hæmatoxylon campeachianum*, and *Pedilanthus tithymaloides.* The variegated form of the latter is very attractive. At hill stations in the south, one sees hedges of the Rose, Fuchsia, Heliotrope, and a purple-foliaged herb called *Gynura nepalensis.*

CULTIVATION.

The opening up of the soil by implements is the first operation of horticulture and has constantly to be repeated at all stages of a garden. In any garden of over half-an-acre in size, it will be found best to plough and harrow, using an English iron plough, such as Ransome's CT_2, for moderately heavy soils, and lighter ploughs such as the Meston, for lighter soils. Ploughing should be done as soon as the land is workable after the rains. It is best to plough twice, the second ploughing at right angles to the first, and to harrow thoroughly. The soil can be left to the action of the sun for a month between the ploughing and the harrowing. The objects of this tillage are (1) to expose and kill weeds, (2) to aerate the soil, (3) to make the plant food available, (4) to produce a good seedbed, (5) to conserve the moisture of the lower layers. If weeds spring up again, they must be harrowed out. In the hot weather the land must be marked out, beds and paths built up, and manure applied and well incorporated with The soil can be left to the action of the sun for a month between the borders must be propagated in the nursery, so that as soon as the rains have set in properly, these plants may be ready for transference to their permanent position.

The special treatment of the soils of fruit and vegetable plots will be dealt with later, but for general purposes it should be remembered that no soil should be allowed to form a hard crust from repeated waterings with no digging. The rake, fork, pick, hoe, or harrow must be used to break up this crust. The beneficial effects on the plants are most marked and in addition the plants can get on with about half the amount of water usually given. A separate description of the nature and possibilities of the various garden tools used for digging or stirring the soil is given later on. This constant stirring is the best antidote for weeds, and prevents their reaching that stage when their size renders them formidable enemies and their removal a matter of trouble and expense.

Twice within this section of the book we have referred casually to the time factor, (1) in connection with the preparation of seedlings and rooted cuttings in time for the break of the rains, and (2) in connection with the early eradication of weeds. We would insist on the importance of this factor in a land where the concentrated heat and warmth cause such rapid growth, and where the onset of the rains is the signal for everything good and bad to burst into growth. It has been our lot to see the loss of a fortnight in planting seedlings mean the loss of half the height of the plant at maturity.

IRRIGATION.

There is, perhaps, scarcely a situation in India adapted for a garden which does not, during several months of the year at least, require irrigation. For the cultivation of culinary vegetables with any degree of success, irrigation is everywhere absolutely indispensable.

Where irrigation is employed, the method of accomplishing it must much depend upon the facilities which the situation offers, and the nearness of the water to the surface of the ground. The following are some methods adopted :—

I. Where the supply of water is from a well.

1. In the United Provinces and Gujarat the general mode of raising water is by means of a large bag, made of the hide of a bullock or buffalo. The bag, suspended from a pulley over the well by a rope of buffalo-hide, is drawn up by a pair of bullocks. From the brink of the well, to a distance as far as the rope reaches, a piece of the ground is dug out, wide enough for two bullocks to go along abreast, deeper and deeper, so as to make a declivity for the bullocks to run down as they draw up the bag. One coolie is employed to drive the bullocks and another has to stand at the brink of the well, and empty the bag as it comes to the surface.

2. In the Deccan of India a common way of drawing up water is by means of a bag and a pair of bullocks, as in the former case ; but in the instance the bag opens into a leathern pipe attatched to its bottom. The pipe has a rope fastened to it whereby it is so contrived that the end of the pipe is raised above the level of the bag whilst ascending ; but when the bag reaches the pulley, the pipe is lowered down over the brink of the well, and the water flows out through it from the bag. This apparatus is called a *mot*.

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The advantage of this method is, that one coolie is dispensed with, none being required, as in the former case, for emptying the bag each time it rises to the surface. The disadvantage is, that the bullocks have to walk backwards up the slope to the brink of the well each time the bag is being lowered again into the water ; and some time is lost in this slow upward backing movement. Iron *mots* are now in use. These have a great advantage over the old type, in which the leather bag quickly perished. The iron *mots*, moreover, have usually a scientifically constructed apparatus to ensure quick filling and complete emptying. One of the best known of these is the Skeen *Mot*, invented by Mr. H. Skeen of Bangalore and now manufactured by Messrs. Kirloskar Brothers, Kirloskarwadi, Aundh State, Bombay Presidency. Messrs. Bhide & Sons, Sangli, also make iron *mots*.

3. In the Punjab the all but universal way of raising water is by what is called the Persian wheel.

In the mouth of the well a large vertical wheel is fixed, over which a looped chain of earthenware pots is suspended, the lower part of the loop reaching down into the water. As this wheel revolves, one length of the chain is continually rising with pots full of water, which, on reaching the summit, discharge themselves into a trough fixed in the upper segment of the wheel, and then turn and descend empty, to be filled again. A large beam, passing through the axis of this wheel, has its extremity fixed in the axis of another large wooden vertical wheel, from the circumference of which projects a series of horizontal wooden cogs, or teeth. These teeth work in the teeth of a large horizontal wooden wheel. By means of a pole projecting from it, a pair of bullocks turn round the horizontal wheel, and so set the whole apparatus in action.

The Persian wheel has the advantage of requiring no coolie beside the one employed in driving the bullocks ; and where the well is of very large dimensions so as to admit of a wheel of great size within it—as it always is when employed for agricultural purposes in the Punjab—the supply of water brought to the surface in a given time is considerable. Its construction, however, at the outset is expensive ; the earthen pots soon become, many of them, broken ; the woodwork is constantly getting out of order and requiring repair; while the quantity of water supplied, though poured forth in a continuous steam, is far less by the hour, has been ascertained by actual measurement, than would be afforded by the bag in the same time.

Persian wheels made of iron and with galvanized iron buckets on chains have been employed and are certainly more lasting though more expensive than the wood, earthenware, and rope apparatus. Engineering firms in Bombay, Karachi, and Calcutta can supply these improved Persian wheels.

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The most efficient of all waterlifts is a rotary pump worked by an oil-engine. The initial expense of this outfit is great, but the saving it effects fully compensates for this. A trained coolie is necessary for the driving of the engine, which is a simple piece of apparatus and easily comprehended by a non-engineer. In an actual test of a pump versus a double *mot*, the *mot* delivered 3,000 gallons per hour at a cost of 10·4 pies per 1,000 gallons. The pump delivered 7,000 gallons per hour at a cost of 9·9 pies per 1,000 gallons. The cost of irrigating an acre of lucerne and sugarcane by *mot* was Rs. 4-12-0 and by pump Rs. 2-4-0. The lift of the water was 25 feet. The engine used was of 4-Brake Horse-power and the pump was a 2½ inch centrifugal pump.

II. When the water is to be raised from a river or tank, and lies near the surface of the ground, as is ordinarily the case in Bengal.

1. One common plan is to throw up the water by means of a light wicker shovel-like basket, or scoop, with a string fastened to each of its corners. Two men, each with two of the strings, one in one hand and one in the other, stand opposite each other by the side of the water, lower the scoop into the water, and with a jerk-kind of movement throw up the water it contains into a dam made to receive it. If the dam is on the same level as the ground, the water is conveyed from it to the part of the garden where it is required, split bamboos being often used as a channel for it ; but if the dam is lower than the level of the ground, two more men are employed in a similar way to throw up water from this lower dam to an upper one on the same level as the ground.

This is a cheap and rude mode of proceeding, resorted to when only a temporary supply of water is required.

2. A method also frequently adopted is to drive a stout stake into the edge of the bank of a tank or river. Upon the top of the stake a long bamboo is made to turn seesaw-like, a small part of it with heavy stone attached moving on the landward side of the stake, and the longer part, from the end of which is suspended upright another bamboo, with a ghurra or earthen pot attached to it seesawing over the water. A man forces the upright bomboo downward till the pot dips beneath the water and is filled ; he then lets the bamboo go and when, by the weight of the stone the pot is drawn up, he empties it, and then forces it down into the water again. This is the *pikota* or *yatam* of the south and the *dhao* of the Mahableshvar strawberry and vegetable gardens.

3. By a contrivance exactly similar in principle, sometimes a wooden trough is employed instead of the earthen pot. One end of the trough is forced down by a man into the water, and then, on being let go, is raised by the weight of a stone that outbalances it, so high that the water is discharged on to the land at the other end.

4. There are now on the market cheap semi-rotary pumps, priced from Rs. 15 upwards, which are easily installed and give very satisfactory work. Any big engineering firm will supply these. In some localities the water drawn from wells is so brackish that the soil watered with it can never be brought into a fertile condition, as is the case at Agra and Delhi. In such situations, it is only where gardens lie contiguous to a river, whence water may be derived for the purpose of irrigation, that they can be cultivated with much success.

Nearly all the important towns in the country have now good water supplies laid on, and although the water thus given is in the first instance intended for purely domestic purposes, there is usually a surplus for garden also. Where such advantages exist, gardening becomes comparatively easy.

The methods for actually supplying water to the soil are many and need consideration separately. Such methods should have as their aim the application of the minimum of water with the maximum of effect. Water led along earth channels sinks into the soil all along the channel. If water is scarce and economy imperative, the channels should be of brick set in concrete and cemented inside. Temporary channels of corrugated iron are very useful and can be shifted from one part of the garden to another as required. In watering lawns a steady flooding all over is desirable. For trees the water is best applied in furrows over the places where the feeding roots of the trees lie. The common system of pouring the water into a small basin immediately round the tree trunk is unscientific and wasteful. For flower beds and pots the watering can is the only satisfactory method. The can should have a "rose" or sprinkler on the end.

In England, America, and Germany there are now advertised installations of piping for watering plants by over-head spraying. The cost of putting these up is considerable and their suitability to Indian conditions is not yet tested. They require water under pressure.

DRAINAGE.

Drainage consists in the withdrawing of surplus water from the soil. Each soil has its own water-holding capacity. When this is exceeded, the aeration of the soil is interfered with. To provide air, drainage is necessary. Another use of drainage is that in undrained land the water is apt to sink into the soil, then reascend and deposit on the surface all the salt it has dissolved, thus making the upper layers saline and noxious to plant life. The proper aeration of the soil means that the roots can breathe, and it also means that the bacteria which change organic nitrogen (i.e., nitrogen locked up in plant and animal remains) into soluble nitrates, have suitable con-

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ditions for growth and activity. In an undrained soil a different kind of bacterial action, not useful to plants, takes place. An undrained soil is cold at any time, whereas a drained soil warms up under the sun's heat. No operation is more indispensable to the well-being of a garden than this, though often it is found exceedingly difficult to effect. In some localities, it proves to be all but impracticable; for there, from the country being nearly of a perfect level there is no place whither the waste water may be carried off. In such situations, after heavy rains, a large portion of the garden will be flooded, and lie completely under water for a week or more. Few of the plants that have been in this way submerged, and then afterwards exposed to the heat of a scorching sun, survive. Frequently, too, about the same time, violent winds prevail, and fruit trees and large shrubs, that have had their roots loosened in the swamped soil, are easily blown over, and, in most instances, destroyed : as before observed, this is an evil often quite irremediable. The best that can be done is, having ascertained the portion of ground that lies lowest, to plant out there such things as are of least value and most easily replaced, as well as those that are least likely to suffer from excess of wet.

In other places, though the ground is equally level, the same difficulty is not so much experienced, from the occurrence of numerous nullahs, ditches, and tanks into which the waste water may be speedily withdrawn.

For fruit plantation good drainage is essential, and this will be dealt with in the chapter on fruit culture. At present we may mention the following types of drain : (1) open, (2) covered. Open drains may be shallow channels for carrying of surface water and may then be only 6 inches deep and 1 foot broad. For draining the subsoil open drains should be from 3 feet to 6 feet deep, from 1 foot to 2 feet broad at the base, and from 1½ feet to 3 feet broad at the top. The edges of such drains need to be planted with *doob* grass to keep them from falling in. Covered drains are not usually employed in this country, but are worth a trial. A covered drain may be made by digging a trench such as is described above for an open drain and laying therein drain tiles, then covering the whole again. Through these tiles the subsoil surplus water passes off. For tiles may be substituted a mass of irregular stones or even brushwood, but these are not so effective. In a country with so long a dry season and so intense heat the covered drain is not so necessary as in a perpetually damp climate.

GLASS-HOUSES.

A glass-house is an expensive luxury. In many parts of India it is unnecessary. Where it is necessary to protect tropical plants during a cold season, then only is a glass-house really required. All other purposes of the glass-house can be fulfilled by the grass conser-

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vatory, hereafter described. The building and management of a glass-house is a highly technical affair, and unless the garden-owner or gardener has had some experience of glass-house management in Europe, he is certain to make a failure of it in India.

GRASS CONSERVATORIES, OR BETEL-HOUSES.

The idea of these is said to be due to a Dr. Anderson, of Bengal, who is mentioned in the early editions. A grass conservatory is made as follows :

On a piece of ground, measured out according to the space required, stout bamboos are driven at intervals, so as to stand erect about seven feet high. To these a lattice of split bamboos is attached much in the way in which enclosures for fowls are usually made in this country. Over the whole lattice, on the sides as well as the tops a layer of *Ooloo* grass is bound, just so thin as to allow of an equal proportion of sunlight and shade, producing a kind of subdued light. Stages are then erected, either of brickwork or wood to rest the potted plants upon, with space left for paths around or between them. The adoption of structures such as this has opened out to the Indian gardener quite a new world, enabling him now to cultivate numberless plants which previously it had been all but hopeless to attempt.

The original idea has, during the past few years, undergone great change, and now one may see huge structures of various ornamental designs erected, not of bamboos and trellis work, but having solid masonry walls, iron standards, and covered over with galvanized wire netting of meshes varying in size to suit individual requirements, the whole being bound with *Ooloo* grass as in the original. The interior is now laid out in ornamental style, with walks, rockeries, beds, reservoirs, and fountains, having quite a fairy-like effect. Here almost anything may be grown :—*Ferns, Orchids, Begonias*, rare palms, *Anthuriums, Alocasias, Crotons, Gloxinias, Gesneras*, and, in fact, the host of rare tropical and subtropical plants, with ornamental foliage and beautiful flowers, which it was impossible before to keep alive even. Such a field have these grass conservatories opened out to the lover of plants, that he may satisfy almost every wish in the matter of plant culture.

To lay out such a conservatory, one must have some knowledge of the requirements of plants. The arc-shape roof is most suitable, as being more convenient than any other, while having an ornamental appearance from the outside. In the Royal Botanical Gardens, Sibpur, there is a fine specimen of a grass conservatory. It is of great extent, and is laid out in the interior with consummate taste and skill, and planted with equal taste. It is, however, not possible for private individuals with ordinary means to possess a structure of such proportions, but it may be taken as a model for guidance in erecting smaller ones.

When about to erect a grass conservatory, select a piece of ground away from the shade of large trees. Its length should, if possible, run north and south. The size will depend upon individual taste, and local circumstances and surroundings. 50 feet by 30 feet is a convenient size.

If it is intended to build an iron structure, T iron should be selected for the superstructure, and angle iron for the supports. Upon the size of the house will depend the size of the iron to be used. The supports should be sunk at least two feet below the surface of the ground, in a concrete bed, the ends, thus buried, having been previously painted over with red lead, to preserve them from corrosion. Ten feet apart is sufficient distance between the posts, which should be not less than 7½ feet above the surface of the ground line. Having erected the supports, build a *pucca* brick wall all round the house, 18 inches high and 2 feet thick, the outer edge being flush with the iron posts, which will thus have extra support to resist the pressure of high winds. Having done this, the roofing may be proceeded with. This is best made in the shape of an arc, as near as possible ; but a flat or span-roof answers just as well. In any case, a line of iron posts must be erected in the centre along the whole length of the house, at intervals of ten feet apart. The two supports at each end of the house should be at least six feet *within* the house, to allow of doors being made. These should be substantial, of iron, covered with galvanized wire netting, and provided with good padlocks, to keep out thieves and intruders. The whole should then be covered over with galvanized wire netting, the roof with a two-inch mesh, and the sides with a one-inch mesh. Over the roof a thin layer of *Ooloo* or other grass should be laid on, so as to admit of an equal division of sunlight and shade.

The interior of the house may be laid out to suit individual tastes ; ornamental beds, borders, rockeries, etc. may be introduced with very pretty effect, while a reservoir for water in the centre, with perhaps a fountain, would add to the beauty of the conservatory. As has been said before, almost anything can be grown in one of these grass conservatories, and the stocking of it will depend very much upon individual tastes.

If it is intended to build a structure not quite so elaborate and expensive, wood (teak is the best) and bamboos may be substituted for iron throughout ; but iron is preferable, especially if the garden owner is a permanent resident in this country. For "birds of passage," a simple wooden structure, or even a bamboo house, will be found good enough for all practical purposes.

An important point to remember in building a conservatory is to select a piece of ground somewhat raised above the surrounding level. This admits of proper drainage being secured during the monsoons. It is a consideration too often lost sight of, and many valuable plants are lost during the heavy rains, by water lodging in the house, which ought to have drained off.

The paths in a conservatory should be laid down with gravel, and should not be less than 2½ to 3 feet wide. What is wanted for paths is some material that will not become slippery and slimy during the monsoons. Bricks used in paving paths become very slimy, and there is always danger of having a nasty fall.

Some gardeners train climbing plants over their conservatories, but this is undesirable, except on the west side in Upper India, and the south side in Lower Bengal. In the former, because the strong hot winds usually blow from the west during the months of April, May, and June ; and in the latter, because there is always a strong southerly wind throughout the summer and rainy months. The roof should on no account have any climbing plants upon it, as they effectually keep out the sun's rays, which are so necessary for the healthy development of the chlorophyll, or green colouring matter of the leaves, and the colour of flowers. The layer of grass is quite sufficient to subdue the hot rays of the sun. This is a precaution very often neglected, and the result is the production of plants of stunted growth having sickly, yellow leaves, and washed-out, colourless flowers. In the south of India, plant-houses are mostly shaded by palm leaves or creepers. The latter possess the advantage of being pretty, and the house looks well enough outside. But on entering such a structure the collection of plants is usually found to be very disappointing. This would not be the case, however, if creepers were carefully selected and properly trained with a view to affording a light shade to the ferns and other plants within. Care must also be taken that the roofs of the creepers do not encroach on the interior, where they would quickly take possession of soil, reserved for crockeries, etc. Plaited coconut leaves, neatly tied on with strong wire, afford a cheap and serviceable shading for plant-houses.

ORCHID-HOUSE.

The cultivation of this curious, but lovely, genus of plants has become so popular that it is no longer surrounded with that mystery which characterised it some years ago, at any rate, in this country. In one or two large gardens, houses have been built for the exclusive culture of Orchids with great success. These plants, in their natural state, are either found on branches of tall trees, or growing in peaty, fibrous matter. In constructing an Orchid-house, the first point to be borne in mind is to provide sufficient moisture. The structure should, in every respect, be similar to the conservatory ; only, in place of the ornamental beds in the interior, a raised masonry platform should occupy the centre of the house, the outer edges of which should be raised about three inches to give it the appearance of a shallow tank or pan, so that it can be filled with water, thus providing a wide expanse from which moisture will always be evaporating, and will keep the atmosphere of the house damp and cool during the hot months of April, May and June. In this shallow tank terrestrial Orchids should be placed upon inverted pots previously arranged therein. Over this expanse of water should be hung other Orchids from the roof, such as particularly love moisture. The sides of the house may have raised platforms, either of masonry or wood-work, for species which do not need so much moisture. In Hill-stations, such as Simla and Mussoorie, where the temperature falls considerably, a glazed structure is necessary, precisely similar to those used in England.

An Orchid-house such as that just described is expensive, and can only be indulged in by those having sufficient means, or by gardens maintained at the public expense. There is, however, no reason why those with limited means should not have an Orchid-house, and for these a small house, upon the grass-conservatory plan, is recommended, with a reservoir in the centre, six feet in diameter, and one foot deep. The sides of the house should be provided with wooden staging. A section of such a house will be found in Fig. 3. The great point to be kept in view being to secure an atmosphere at once damp and cool, at a time when the fiery hot winds scorch up everything. It is not proposed to enter into the system of cultivating these curious plants here. Detailed instructions will be found in their proper place, under *Orchids*.

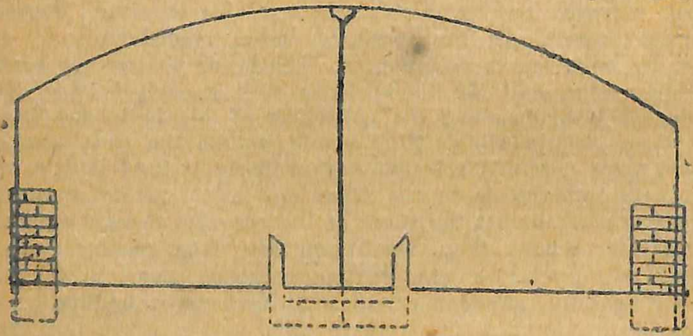

Fig. 3.

FRAMES AND PITS.

Every garden of any pretensions whatsoever should be provided with frames and pits for propagating plants. Glazed frames, with cloth awnings to keep out the fierce rays of the sun, are excellent for the propagation of plants. They should be made of common dealwood, and glazed with the common glass to be had of any bazar glazier. They may either be span-roofed, half-span, or with plain, sloping roofs. A span roof is preferable, as then one can get at both sides of the frame conveniently. There might be a regular range of these frames, made in any convenient size, say 4′ × 2′-6″. They ought never to be fixtures, but portable. In Figs. 4 to 6 will be found a

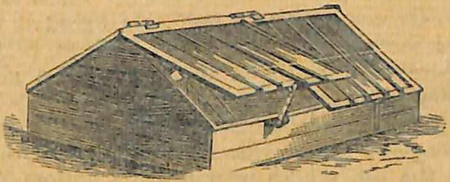

Fig. 4.

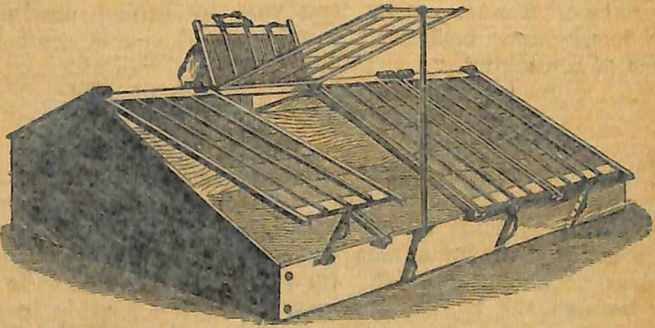

Fig. 5.

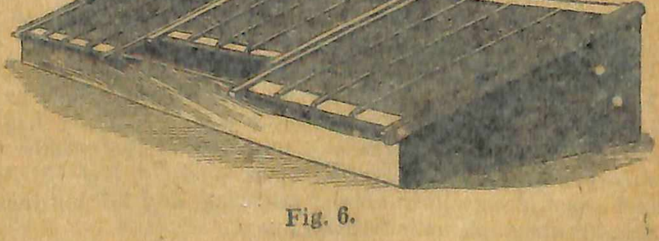

Fig. 6.

very good idea of what is meant. A shady situation should be selected to place them in hot districts and the reverse in cool climates. The bottom should be well drained, and filled with pure river sand to strike cuttings in. In cool climates bottom-heat is necessary, and pots or pans are usually used to put cuttings in, which are then plunged into a hot-bed previously prepared. By pits are meant propagating pits. Having selected a suitable site in a shady situation, dig a trench or pit of any required dimension, about one foot deep. Fill this with partially-decayed cowdung or horse-litter mixed with a third part of half-decayed leaf mould, bringing it up to about 6 inches above the surface of the ground. These pits may either be shaded by an awning of cloth on the south, or a glazed frame may be put over them. For striking cuttings in the winter months in cool climates these are invaluable. Of course, the cuttings are first placed in pots or pans filled with river sand, and the latter plunged up to the rim in the pit, which provides the bottom-heat so necessary in the cold months. Where cold is intense, pits of large size are made, and all potted plants likely to suffer in winter are plunged into them, with a common piece of thatch-work overhead, and are thus protected. Tender plants, and such as cannot possibly withstand a temperature below 50° Fahr. are, of course, kept in glass structures of some kind.

DECORATIONS.

For the decoration of a garden, statuary and other non-living objects, such as vases, urns, and even cannon, are employed. The use of statuary requires considerable taste. It is obviously undesirable to erect a statue of a man struggling with a python in a spot intended as an abode of peace. On the other band, a figure of Pan peering through the leaves from some sheltered spot is in keeping with the spirit of the place. A fine carving of a sacred bull adorns the Junagadh State Gardens. A group of sportive urchins makes an excellent centre-piece for a conservatory, enhancing by its whiteness the delicate green of the foliage. Anything quaint, old, significant or symbolical may be used for garden decoration.

In the supporting of climbing plants various decorative structures may be built, but it is an artistic error to erect a pole or an arch for climbers in the midst of a lawn or other open space. Climbers cover trellis-work beautifully, and may thus be employed as screens or backgrounds. No stone pillar should be without its trailing creeper, and a walk can be completely covered with a pergola from whose side and roof droop the foliage and blossoms of the creeper. Such a pergola is constructed by erecting stout posts, 8 feet above ground and 6 feet apart along either side of the walk, and joining them across the path and along the path with beams.

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A very pleasing contrivance for growing creeping plants is either at some spot where footpaths intersect, or in a corner of the gardens, where the footpath takes a turn at right angles, to erect at each angle a pillar of masonry, about six feet high and fourteen inches in thickness. To the sides of these pillars attach a trellis of bamboo, and upon their summit erect a sloping roof of trellis. Structures of this kind may unquestionably be made to look very ornamental, overgrown with plants always in blossom like *Pharbitis Leari*, or *Cryptostegia grandiflora.*

For creepers grown in pots, trellis-work of bamboo or frames of iron may be contrived of various devices. Common examples of this kind of ornament are represented in Figs. 7, 8, and 9. For some plants, such as *Ferns, Achimenes,* etc., hanging baskets are much used in England, and considered very ornamental. An example of a very fine hanging basket will be found in Fig. 10. In this country, however, the unremitting attention such things demand in the way of watering will perhaps be thought to entail more trouble than they merit. Several of the Orchids, notwithstanding, are grown in this way, and baskets of wood, or copper-wire, or coconut husk, of various elegant devices, are made for containing them, as well as sometimes perforated earthenware vessels.

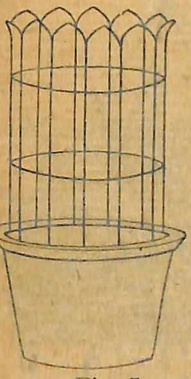


Fig. 7.

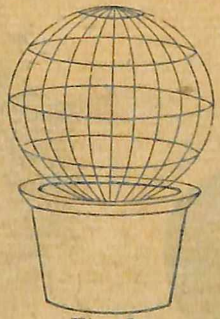


Fig. 8.

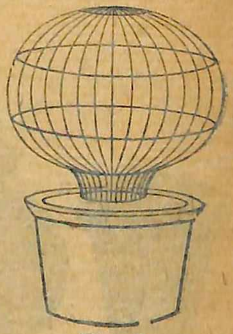


Fig. 9.

Billbergias and their allies, suspended with a small ball of moss tied round their roots, bloom almost immediately. *Russellia juncea* looks well when hung up in a pot.

For small ornamental shrubs and perennials, there is nothing that looks better than an ordinary flower-pot, kept scrupulously clean. Absolute cleanliness and neatness in a garden are, after all, decorations in themselves. In a filthy pot the handsomest plant loses its charm. The inner side of the hush of a coconut is a capital thing for scrubbing a flower-pot when it has become soiled and dirty.

HANGING-POTS.—In public gardens it is not unusual to find quite a variety of ornamental pots suspended in plant-houses with suitable plants growing in them. Of this class the perforated pot for Maiden-hair (Fig. 9*a*) is one of the most useful and effective in a moist fernery.

These pots being filled with a light compost consisting of equal parts of peat, leaf mould, lumps of old mortar, and decayed moss offer an excellent receptacle for the growth of Maiden-hair ferns. Little bits of the latter, planted in the mouth of the pot and in each perforation, and kept moist, soon form a perfect ball of beautiful foliage.

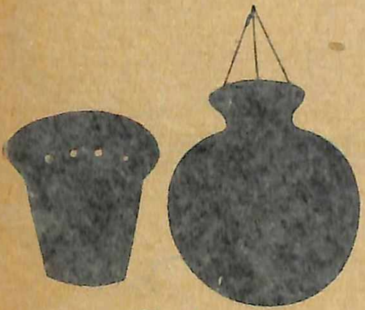


Fig. 9*a*.

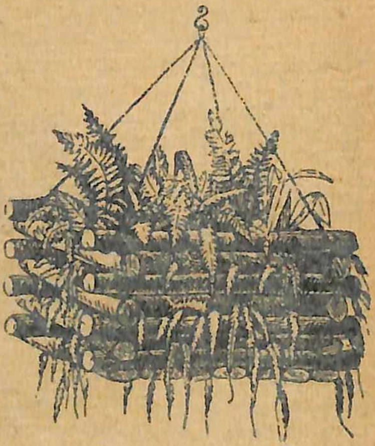


Fig. 10.

TUBS.—Common wooden tubs, painted green, and raised on rustic stands, may also be used with advantage. A beer barrel, saw in two, gives a couple of excellent tubs. It is also possible to have large concrete tubs made to one's own design. Square tubs, with roses grown in them. An illustration of this will be found in Fig. 15. An important point to bear in mind is to have thorough drainage, as without it nothing will grow in tubs satisfactorily. Another important point to remember is, never to put into a tub any plant that has not or will not have ultimately sufficient roots to fill it. The evils of over-potting will be as apparent in tubs as in pots if this precaution is disregarded.

CSL

ARBOURS, ETC.—Ornamental arches made of iron, and covered over with galvanized wire netting, have a very fine appearance when properly placed, with such plants as *Bignonia venusta, Bougainvillea spectabilis, Passiflora vitifolia* and other large-growing creepers trained over them. Bowers, either rustic or of iron-work, may be erected to suit individual tastes. No garden is complete without garden-seats. These can now be had of all kinds and designs, and at moderate cost.

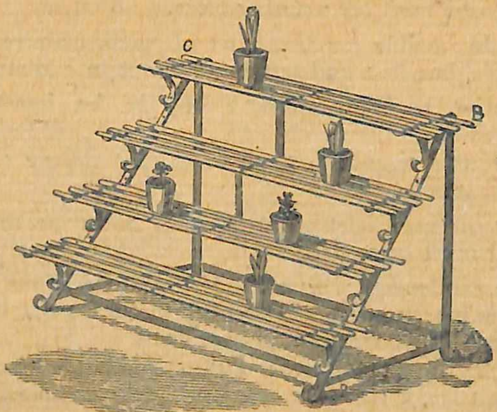


Fig. 11.

Fig. 12.

The placing of seats is a matter for individual taste, but obviously they must be in situations where strong sun is avoided and where there is something in the garden to look at. Along the edge of drives they are worse than useless.

TOOLS: THEIR USE AND ABUSE

AXE—For the cutting down of tree and breaking up of firewood; on no account to be used for pruning trees.

BARROW—Invaluable for transport of earth, manure, and weeds; apt to be roughly handled and left lying about in a dirty condition.

BUCKET—For carrying water; apt to be handled like the barrow.

CROWBAR—For loosening hard earth, for boring into rock, and for levering up stumps.

DIBBLE—A pointed stick used to make holes for the insertion of plants; the soil must be moist.

FORK—An implement with a spade-handle and four large prongs; useful for loosening soil and for turning manure; apt to be used for raising clods and thus having its prongs bent.

FRUIT-PICKER—A long pole with a small blade and net at its end to sever and catch the fruit; necessary for mangoes.

HOE (DUTCH)—A blade fixed at an angle on a long handle; properly used, it is the quickest weeding implement available.

KHURPI—The sandby of the mâlee, a hook used for stirring soil, weeding, and cutting crops; an inefficient instrument except for pots.

KNIFE (BUDDING)—A fine blade cutting with its tip, set in a flat bone handle; when used for pruning, sharpening pencils, and cutting string its usefulness is gone.

KNIFE (PRUNING)—An inwardly curved blade set in a horn handle; must be used with a sharp sudden movement; often allowed to get rusty.

KNIFE (GRAFTING)—Like the above but straight-bladed.

LAWN-MOWER—To be used and cleaned by a trained man only.

PICK—For opening up hard soil; often twisted and damaged against rock.

RAKE—Essential for the good appearance of flower-beds and paths; usually put away in a filthy condition and allowed to rust.

SPADE—The Indian spade is the *kudali* or *paoda*, with blade set in like that of an adze and used similarly, not so efficient as the straight spade, but the only possible implement for a barefooted worker.

SICKLE—(Not a *khurpi*) a really big sharp sickle is a first-class instrument for quickly clearing up odd corners where grass has grown long.

SPRAYER—For the application of Bordeaux mixture, Incosopol and other remedies; the best are the automatic type such as the

Holder-Harriden and Four Oaks sprayers, the cheapest are the bucket sprayers, medium are the knapsack sprayers; the tubing gives out first.

SYRINGE—A squirt for spraying the foliage of small plants, specially useful in a conservatory.

SECATEURS—An efficient pruning instrument, which should be widely popularised; they are spoiled when used for woody branches over ⅓ inch diameter; the springs are apt to get lost and the springs and blades are often left without oil.

SAW—For pruning branches above ⅓ inch diameter; the cuts must be trimmed with a pruning knife and tarred at once; used with unnecessary violence, the saw becomes permanently blunt.

SHEARS (EDGING)—For trimming edgings of *Alternanthera* and similar plants.

SHEARS (BRANCH)—For pruning branches out of reach of secateurs, to be used like secateurs; will cut branches up to ½ inch diameter.

SCISSORS (FLOWER-GATHERING)—Not to be entrusted to the mâlee, keep clean and well oiled.

WATERING-CAN—Must have a "rose," and be soldered whenever a hole appears.

All tools immediately after use must be cleansed of any earth or plant juice adhering to them, and dried. Blades, springs, and joints must be at once oiled with a lubricating oil, and all tools replaced in their proper receptacles. Treated in this way and with the precautions mentioned after each tool, the instruments will last three times longer than they now usually do.

SHADES.

Shades or screens of some description or other are absolutely necessary for protecting young plants from the powerful rays of the sun, on being first put out in the open ground. For want of some such protection, numberless plants that are put out during the dry months become burnt up and perish. Nothing can be better perhaps for small plants than inverted flower-pots, with a portion of one side cut or broken off. These should be put over the plant during the day, with the open part, of course, towards the north, and removed at sunset.

It is also an excellent plan, especially for borders, to set freshly cut leafy branches of trees to shade the seedlings. Trees such as the *nim (Azadirachta indica)* are ideal for this purpose, since their feather-shaped leaves screen the plant from the full blaze of the sun and yet allow a fair amount of diffused light to get through. The gradual dropping of the leaves of these protective branches, as they dry up, gives a gradual transition from shade to light.

CSL

The stem of a large Plantain slit in two, and cut into portions, affords a supply of half-pipes, which serve admirably for laying over young seedlings to screen them when first planted out.

For larger plants, such as young Mango-grafts, Lichees, etc., some coarse kind of matting may be employed bent round and fastened with stakes.

Such plants may also be effectively shaded by cones of grass built up on tripods of sticks. Such a cone should be open to the north and kept moist with a sprayer.

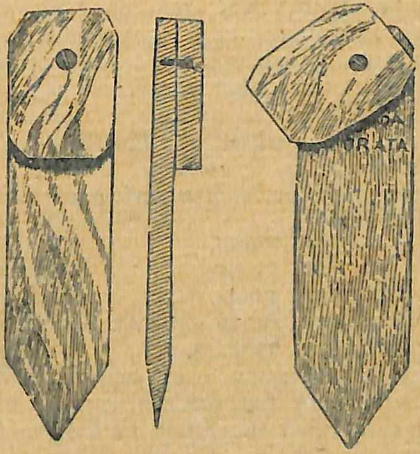
LABELS.

The correct lebelling of plants is very necessary in a garden of any pretensions. Our memories are liable to fail us sometimes, and then confusion arises regarding the identity of plants. In any part of a garden intended mainly for beauty, labels should be absent or concealed. Various devices have been resorted to for preserving the writing on labels. Some years ago zinc labels of many designs, both for hanging and inserting in the soil, first came into use. The ink used is perfectly colourless, but it immediately turns jet black on being applied to the zinc, and remains indelible for two or three years. These are very useful, and can be recommended. They can be had of any seeds-man at home and from Sutton and Sons, Calcutta. The ink used is called "Yeate's Indelible Ink for Zinc Labels," and is procurable from the same sources.

For great durability labels made of sheet iron are often used, especially in Botanical Gardens, painted black, with the name of the plant written upon them in white. A simple and speedy way of effecting the same thing is to paint the labels white; and then, when quite dry, paint them over again black, and while the black paint is still wet, write upon it with a broad-nibbed reed-pen the name of the plant. The reed-pen, as the writing is proceeded with, removes the wet black paint, and leaves exposed the name of the plant on the white paint below.

Another novel device has been introduced by an American gentleman, Mr. Hild, of Illinois, and was figured in the *American Agriculturist* of March, 1887 (*see* Fig. 13). The label is a wooden one, and consists in fastening, with a small screw, a short piece of wood or metal over the name, as seen at *a*; a cross section is shown at *b*; and at *c* the cover is partly removed to show the arrangement. Of course, any size labels may be used. A point of some importance to be kept in view, when using wooden labels, is to prevent the lower end, which is in the soil, from decaying. A good plan is to dip the pointed ends in coal-tar, pitch or dammar. An effectual way is to first soak them in a solution of sulphate of iron. When dry, soak them in a strong solution of lime water till the wood is quite saturated. This will form an insoluble sulphate of lime in the woody tissue, and preserve them.

One of the commonest, easiest, and most serviceable methods of labelling plants, however, is to prepare splints of bamboo of common dealwood, by sharpening one end for sticking in the ground and flattening the other end, and planing it. On this smear some white paint, and while wet, write upon it with a lead pencil. When the paint dries, the pencil writing will remain fixed in the body of the paint, and last indelible for a long time. To prevent the lower or pointed ends from decaying, dip in dammar, or soak in the solution recommended above. These labels can be made for suspending also by having both ends flat, and a small hole bored at one end.



a b c

Fig. 13.

All painted or written labels sooner or later become defaced. Where a label is not for information to the public, but merely to enable the owner to identify the plant, a zinc label with the name punched on it is excellent. Small chisels each with a letter on the tip are sold for this purpose.

Labels of card, paper, or parchment are worse than useless; for not only is the writing obliterated in a few days, but the material is destroyed in a very short time. Add to these disadvantages the fact of these labels attracting crows, which peck them off, and do more or less injury to the young seedlings.

The attachment of labels requires some care. A wire tightly encircling a tree trunk or branch soon cuts into it as the tree thickens, and thus the plant is damaged. Nails driven into trees are undesirable. Labels fixed on iron stakes and set in the ground are apt to be lifted and stolen. On the whole the best method is to attach the label to an inconspicuous branch by means of a loose wire, where the label is not intended for the information of the public. Where it is, the label must be nailed to the tree in a visible position.

No one should trust entirely to his memory in the spelling of the scientific names of plants. Too often one sees a well-painted label spoiled by some easily avoidable spelling error. This may seem a small matter, but a misspelt name proclaims at once the amateurishness and carelessness of the label-writer.

GARDEN ENEMIES.

Plants in gardens suffer from a variety of causes. These may be briefly classified thus :—

(1) Fungi.
(2) Insects.
(3) Birds.
(4) Other animals.
(5) Thieves.

In addition, bad cultivation, water-logging, and similar unhealthy conditions induce disease, but for the purpose of this section only the five headings mentioned above will be discussed.

(1) FUNGI.

The fungi are plants which have given up all attempts to procure their own food, and have settled down to a life of robbery. The body of a fungus consists essentially of many fine threads which penetrate the so-called "host" plant on which it is parasitic and from which it draws its nourishment. On these threads arise fruit-bodies of various shapes which produce millions of tiny unicellular bodies known as *spores*, which function as the seeds of the fungus and infect other plants. It should be stated that *all* fungi do not get their food from living host plants; some, like the mushrooms, are satisfied with dead organic matter. The latter class, known as saprophytes, have, however, in many cases, the faculty of becoming parasitic on living plants if given an opportunity. Hence the necessity for tarring wounds in plants. The following are some of the principal kinds of fungi.

Mildews.

These comprise numerous parasitical genera, species, and vraieties of fungi, characteristic forms of which are represented by the rose and peach mildew, *Sphænatheca pannosa*; vine powdery-mildew, *Uncinula spiralis*; pea mildew, called in its first stage *Oidium erysiphoides*, and in its second *Erisyphe Martii*; violet mildew, *Peronospora violæ*, and many other familiar forms. The condition least favourable to the growth of these parasites is the vigorous, healthy growth of their hosts in a properly ventilated and well-drained position. They should be combated by the application of suitable fungicides directly they appear on the leaves or fruit and if there is reason to anticipate an attack, a prophylactic spraying should be given *before* the disease appears. Although the disease may not be entirely eradicated by prompt measures, the evil caused by it will be greatly mitigated. Bordeaux mixture is an excellent general fungicide for mildews, and similar surface parasites. The mixture is applied by spraying. Professor B. T. Galloway, of the United States Department of Agriculture, gives the following improved method of preparing Bordeaux mixture :—

"All things considered, it is believed that the best results will be obtained from the use of what is known as the 50-gallon formula of this preparation. This contains—

Water	50 gallons.
Copper sulphate	6 pounds.
Unslaked lime	4 „

"In a barrel or other suitable vessel place 25 gallons of water. Weigh out 6 pounds of copper sulphate, then tie the same in a piece of coarse gunny sack, and suspend it just beneath the surface of the water. By tying the bag to a stick laid across the top of the barrel, no further attention will be required. In another vessel slake 4 pounds of lime using care in order to obtain a smooth paste, free from grit and small lumps. To accomplish this, it is best to place the lime in an ordinary water-pail and add only a small quantity of water at first, say a quart, or a quart and-a-half. When the lime begins to crack and crumble and the water to disappear, add another quart or more, exercising care that the lime at no time gets too dry. Towards the end, considerable water would be required, but if added carefully and slowly, a perfectly smooth paste will be obtained provided, of course, the lime is of good quality.

"When the lime is slaked, add sufficient water to the paste to bring the whole up to 25 gallons; when the copper sulphate is entirely dissolved and the lime is cool, pour the lime milk and copper sulphate solution slowly together into a barrel holding 50 gallons. The milk of lime should be thoroughly stirred before pouring. The method described ensures good mixing, but to complete this work, the barrel of liquid should receive a final stirring for at least three minutes, with a broad wooden paddle.

"It is now necessary to determine whether the mixture is perfect—that is, if it will be safe to apply it to tender foliage. To accomplish this, two simple tests may be used: First, insert the

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blade of a penknife in the mixture, allowing it to remain for at least one minute. If metallic copper forms on the blade, or, in other words, if the polished surface of the steel assumes the colour of copper plate, the mixture is unsafe, and more lime must be added. If, on the other hand, the blade of the knife remains unchanged, it is safe to conclude that the mixture is as perfect as it can be made. As an additional test, however, some of the mixture may be poured into an old plate or saucer, and while held between the eyes and the light, the breath should be gently blown upon the liquid for at least half a minute. If the mixture is properly made, a thin pellicle, looking like oil on water, will begin to form on the surface of the liquid. If no pellicle forms, more lime should be added."

Other remedies for mildews are sulphide of potassium and sulphur.

Half an ounce of sulphide of potassium to a gallon of water is advantageously used as a spray for all the visible mildews.

Sulphur dust is a certain remedy for powdery mildews, and is largely replacing Bordeaux mixture for the treatment of these diseases. The value of sulphur depends on its fineness, since the finer the particles, the more quickly does the sulphur change into the acid which kills the mildew. Sulphur can be obtained as ground sulphur, flowers of sulphur, or milk of sulphur. There does not seem to be any difference in the efficacy of these forms if they are of equal fineness. Sulphur may be applied at any time of the day provided there is not much wind or excessive moisture. Dry warm still weather is best. After an application of sulphur, four days should elapse without rain, otherwise another application of sulphur is necessary. When the temperature rises above 110°F., sulphur may damage the plant tissues.

(For Sprayers and Dusting Machines *see* pages 56 and 57.)

Rusts.

Numerous hurtful diseases come under this class, many of them having a wide geographical area. White rust—*Cystopus Candidus*—mostly affects herbs of the natural order Cruciferæ, such as the cabbage radish, etc.

"Infection only takes place during the seedling stage, hence the disease does not spread among older plants. Diseased plants, both wild and cultivated, should be destroyed." *Massee.*

Black rust—*Puccinia graminis,* Pers.—is a well-known scourge of cereal and other grasses in nearly all parts of the world. A large proportion of the rusts which attack cultivated plants are species of the genus *Puccinia.* Grasses, such as maize and wheat; flowering plants, such as the rose and chrysanthemum; fruiting plants, such as the plum and raspberry; and culinary vegetables, such

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as celery and beetroot, all suffer from the attack of various kinds of rusts. Burning every vestige of the affected crop is the surest means of eventually removing the disease. Spraying is ineffective against rusts. The favouring conditions for a rust attack, as for attacks of other fungi, are moist atmosphere, heat and lack of ventilation and light. It follows that sparing irrigation, drainage, free play of air and sunlight are preventives of the disease.

(2) INSECTS.

The best simple account of insect pests is that given by Maxwell-Lefroy in Bulletin 23 of 1911 of the Agricultural Research Institute, Pusa, from which the following is quoted :—

"Speaking generally, there are two classes of insects against which insecticides must be used ; these are, *first*, caterpillars, grass-hoppers, bettles and other biting insects, which by eating the leaves and buds destroy the plant, and *secondly*, bugs scale insects, mealy bugs and the like, which by sucking out the sap of leaves or shoots weaken and kill the plant. Against the first, we use a 'Stomach Poison, i.e., one that acts through the stomach and is applied to the part of the plant to be eaten in such a way that the insect in feeding takes it into its stomach. Against the second, we must use something different, as an insect that sucks sap does not necessarily absorb a solid insecticide applied to the outside of a plant ; we use accordingly an insecticide which we apply to the insect itself, which acts by contact with its skin and which is accordingly called a 'Contact Poison.' Contact poisons of course, act on all insects, however they feed, but to kill large caterpillars, beetles, or grass-hoppers, we require such strong contact poisons that as a rule, it is cheaper and better to apply to the plant a stomach poison ; in rare cases we use a contact poison for biting insects, as a rule only if they are small." Maxwell-Lefroy considers lead chromate the most useful stomach poison and says : "In using lead chromate one may use the paste taking 1½ oz. paste to yield 1 oz. of lead chromate, one may use the dried paste rubbing it up with water ; or one may make the compound by dissolving separately 1 oz. of potassium bichromate and 2 oz. of lead acetate (or lead nitrate) and mixing the two solutions, when 2 oz. of lead chromate will be precipitated as a flocculent yellow mass. As a rule, it is best to buy the paste and use that." The strengths used are 1½ lbs. paste to 30 or 60 gallons of water i.e., ¾ to 1½ oz. to a kerosene tinful of water. As contact poisons Maxwell-Lefroy recommends rosin compound and crude oil emulsion. Rosin compound is made by boiling 1 lb. of washing soda with 2 lbs. powdered rosin in a gallon of water, during the boiling cold water is added till the liquid becomes clear and thin like clear coffee. It amounts to about 3 gallons. Four pints of this solution made up to 4 gallons with water is the usual strength. Crude oil emulsion is an emulsion of 20 per cent soft (fish oil) soap with 80 per cent of crude mineral oil (containing kerosene). Two-thirds of a pint of it in 4 gallons of water is the usual strength.

For soil caterpillars and white ants Maxwell-Lefroy recommends mixing phenyl, sanitary fluid or crude creosote with earth at 1 in 20 by volume and applying this mixture to the surface of the soil. It is best to remove a little soil near the plants and put in this medicated soil. For surface caterpillars, those caterpillars which live in the soil and come out at night to cut down young plants, a bait made of bran, sugar and white arsenic or lead chromate is the best remedy. This is made by dissolving a *chittack* of white arsenic and two *chittacks* of crude sugar (*gur* or jaggery) in two seers of water and mixing thoroughly with 2½ seers of *choka* (bran, not chopped straw). Put this down in small handfuls.

The only case where lead chromate cannot be applied is on well formed cabbages or lettuce which will soon be cut. Then it is desirable to use naphthalin emulsion which evaporates in 24 hours. This is made by dissolving 6 oz. of concentrated size (Sirish) in ⅛ gallon of hot water, and adding 1 lb. soft soap. Then as much naphthalin as it will take up is dissolved in 2 gallons of kerosene. At ordinary temperatures this is about 2 lbs. 12 oz. Add the naphthalin solution to the hot size soap solution, add ½ gallon water, and churn with a syringe or sprayer.

Other Remedies.—(*a*) A most useful remedy for all kinds of sucking insects is *fish-oil-resin soap.* This is a semi-solid substance easily soluble in water. It is usually employed in the proportion of ½ lb. of the soap to four gallons of water. It is obtainable from the Government Soap Factory Calicut, Malabar, and from Messrs. Dharamsi Morarji & Co., Ambarnath, near Kalyan, Bombay Presidency.

(*b*) *Lime-sulphur* wash is specially valuable against mites. It is made thus :—Take 6 lbs. flowers of sulphur and make it into a thin paste with half a gallon of water. In a zinc or iron vessel (*not* a copper vessel) put 3 lbs. unslaked lime. Add very cautiously half a gallon of water, and allow to boil. When it begins to boil, add the sulphur paste. Add two more gallons of water. Boil on a low flame, stirring with a stick to prevent frothing and spurting. Continue till a coffee-coloured liquid results. This may take an hour. There will be a small sediment. Strain through sacking, and store in closed iron drums. This is stock solution and must be diluted before use with 90 gallons of water.

(*c*) *"Cyanogas" Calcium cyanide* is a proprietary product of the American Cyanamide Co., and can be got in tins as dust or granules from Messrs. Shaw, Wallace & Co., Bombay. It rapidly gives off prussic-acid gas in contact with air, and must be used with caution.

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It is valuable for fumigating closed spaces; for the destruction of burrowing animals such as rats, crabs, and white ants; for the open-air dusting of plants suffering from aphides; and as a poisonous barrier against army worms and locusts.

Ants.—These are perhaps the most formidable of all pests that the Indian gardener has to contend against. They are remarkably found of nearly all kinds of small seed, and will often clear off every grain of it from an extensive sowing within a very short time after it has been made. Lettuce-seed they are especially fond of, which, when sown in the open ground, it is very difficult to save from their depredations. With regard to flower-seeds, when very choice, or when there is but a small supply, the only safe plan is to make the sowing in a seed-gumlah, supported on an empty flower-pot, standing in a pan of water. In flower-pots, moreover, potted with any loose kind of material, such as employed for orchids, they are very destructive, establishing themselves by hundreds laying their eggs, and breeding their young. They cannot be allowed to remain with safety to the plant, nor can they be easily removed, without more or less injuring it at the same time. A saucer of sweet oil is an irresistible bait to them, into which they will rush and destroy themselves.

Upon the means of destroying ants, Captain Weston makes the following remarks: "The usual way of getting rid of the red ant is, I believe, by powdered turmeric or *huldee*. I, however, found a plan my mâlee had last year more successful. When the seeds were sown, a coconut, with the kernel in it, was cut in halves and laid near the seeds; the ants flocked to it, and when it was full of them it was immersed in hot water. The nuts were watched during the day, and in three days no more made their appearance. A few days after they made their appearance again, when they were treated in the same way, and again similarly disposed of. My plan, when I find a nest of red ants in the road, or any part of the compound, is to bund the spot round with clay and pour in boiling water, and I have found it efficient in the destruction of the red ants."*

White-Ants—These pests have a wide reputation for mischief. It has been asserted by competent authorities that they rarely, if ever, attack living plants or trees; that in every case where they have been discovered attacking the roots, the trees have invariably died first, and that as a rule their attacks are confined to posts and stakes, but experience is against this statement.

It is probable, however, that it is only in dry, sandy soils that these termites attack living plants. Wherever found, their nests must be destroyed, and the queen white-ant killed. White-ant exterminators are now sold consisting of apparatus for producing and blowing

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*"Journal of the Agri.-Hort. Society," Vol. X, page 81.

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fumes of sulphur and arsenic into their nests. These are effective. "Cyanogas" is a valuable remedy.

Grubs.—These are for the most part the larvæ of beetles. The ravage they commit is almost entirely confined to the roots of potted plants, in eating away the fibrous parts, and thus ultimately causing the plants to perish. They are generally introduced in the cow-manure employed when the plants are potted. All that is required to keep clear of them is to examine the manure carefully before using it, picking out whatever grubs are found, and destroying them. In South India the large, bloated grub of the cockchafer is a most troublesome pest. During the dry season it remains in a state of torpidity, deeply buried in such soils as are largely composed of organic matter. Heaps of leaf mould, cattle manure, and prepared composts are usually full of them. In flower-beds, a complete change of soil to a depth of one foot is often necessary. With the advent of the S.-W. monsoon the grub becomes active, and consumes the roots of soft-wooded plants voraciously, the flowering plants specially preferred being Geranium, Verbena, Aster, Phlox, Drummondii, Petunia, Dianthus, Antirrhinum, Delphinum, Iberis and various genera of Compositæ. The best remedy is a resubstitution of fresh mineral soil once a year. Occasional top-dressings of gas lime are useful. The application of creosoted soil is beneficial. Where in spite of all precautions, grubs are found in a flower-bed *after* the plants have grown to, say, six inches or a foot in height, the best thing is to transplant the plants to pots, keep them in light shade, and renew the soil of the bed. The plants can be back again if the re-transplanting is carefully done. "Cyanogas" may be mixed with soil for killing such grubs.

(3) BIRDS.

Crows.—These, when the fit takes them, are perhaps the most formidable of all enemies to young plants in pots. It is almost certain ruin to leave freshly-potted bulbous-plants exposed in any place which crows frequent; for, even if they do not pull the bulbs out immediately, they will be almost sure to peck them to pieces as soon as they have pushed a little above ground. Paper labels never escape being destroyed by them.

There are only two ways of protecting plants from their attacks. The simplest is to shoot one occasionally, and hang it up for a day or two in the spot from whence it is desired to scare them. The other method is to protect the plants with a net.

Sparrows.—There are few kinds of vermin more destructive. For annuals they have an especial fondness, and in a very short time will clear off the young seedlings from almost any number of pots. Of a sowing of beet, not a particle will escape them as soon as the

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seedlings rise above ground, and upon a crop of peas they feed ravenously.

Nets, when they can be obtained, are the only efficient means of sheltering plants from the mischief they do them.

Parrots.—The little green parrot is a most destructive bird to ripening fruit, unless nets be thrown over the tree to keep it off.

(4) OTHER ANIMALS.

Flying Foxes.—These commit their depredations on ripening fruit by night. A net is the only safeguard against them.

Rats.—No piece of ground where rats have established themselves can be of any use for cultivation until they have been extirpated. They can be got rid of by making pellets, about the size of a marble, with flour and water mixed with a little powdered arsenic. These, placed at the entrance of the freshly made holes in the evening, have disappeared in the morning and the rats with them. Poisoning, however, is unsatisfactory, since no one desires dead rats lying about, and one is never certain whether the rat has died from plague or not. Traps are best and of these the spring trap that hits its victim on the neck and holds it, is the most efficient.

Captain Weston states that blowing the fumes of sulphur into their holes by means of a common bellows is an effectual method of destroying them.*

Squirrels ; Baboons.—These animals are sometimes very destructive to fruit, and must be scared off.

Rabbits.—These, where they abound, are very destructive, and there is no protection from them but a fence of wire-netting.

Jackals.—These do no very great harm in a garden beyond occasionally scratching up a hole to the injury of any plant that may be in the way. For those, however, who consider them a nuisance they would gladly get rid of, the following extract is given :—

> "Our host told us that about two years ago he got some nux vomica and other poisons, mixed them with tallow, and enclosed small lumps of this mixture in pieces of the entrails of sheep, which he dragged about his yard in the evening, and then hung upon a bush, afterwards dropping pieces containing poison along the track. The first morning after he had done this, fifteen jackals were found dead about the premises."†

Porcupines.—In parts of India where these animals abount they are exceedingly injurious to gardens. The usual method adopted for their destruction is to dig pits to entrap them.

Goats.—All kinds of animals, it is needless to observe, should be excluded as much as possible from a garden, but few more scrupulously than goats, for they are about the most pernicious. They are especially fond of Rose-trees, giving them the preference to all others.

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* "Journal of Agri.-Hort. Society," Vol. IX, p. c.

† Ellis's "Madagascar," p. 222.

(5) THIEVES.

It is well, if possible, to exclude all servants but the mâlees from the garden, as they are much given to pilfer the best of the fruits and vegetables. But it is principally in Calcutta and its vicinity that the theft of ornamental plants is much to be feared, and there it is of continual occurrence. When a theft of this kind takes place, it may be laid down for certain that it is either the act of the mâlee himself, or done with his concurrence. For many of the thefts, however, of valuable plants the actual thieves are not so much to blame as those who purchase from them.

A thorny hedge or barbed wire fence will assist to keep out thieves. It is an excellent idea also, if a visit of fruit thieves is expected, to leave several strands of barbed wire lying loosely about all over the spot which they will visit. This must be done personally, after dark.

SPRAYERS.

The following are types of sprayers :—

1. The syringe, with a spraying nozzle ; useful for individual plants and small trees.

2. The bucket sprayer, worked in a bucket or kerosene tin; useful for all purposes in a small garden.

3. The knapsack sprayer, with a pump, fixed to a metal reservoir carried on the operator's back and worked by one hand, the other hand directing the spray ; excellent for larger areas ; can spray two acres of field crop a day and reach the top of trees 15 feet high.

4. The automatic sprayer, with a means for compressing air inside it, allowing both hands to be free when working ; the light pumps are invaluable when trees have to be climbed ; carried on the back or shoulder.

5. The barrel sprayer, on wheels, with a powerful pump : a sort of small fire engine ; useful for large areas and large trees.

The Bordeaux nozzle is best for all work.

Sprayers must be treated as follows :—

1. Use them at regular intervals, even if only to spray water, as this keeps them in good condition.
2. After spraying, always clean out the machine, and pump clear water through.

3. Leave plain water in barrels or wooden reservoirs to prevent shrinking and cracking, or sink the barrels in a pond or tank.
4. Do not let rubber hose be bent at a sharpangle.
5. Always strain all water or insecticide as it is poured into the machine.
6. Kerosene attacks rubber, so wash it well out of the hose.

DUSTING MACHINES.

The use of sulphur dust has brought on to the market a variety of machines for applying that dust in a fine cloud. The two main types are (1) the bellows type, (2) the fan type. In the first type the sulphur dust is blown out of the container by a bellows and in the second a centrifugal fan worked by a crank. The dust in both cases is directed by a flat nozzle at the end of a long pipe. The first type is the Torpille Knapsack Powder Sprayers and the second type, the Peerless Dust Gun, manufactured by the Peerless Dust Gun Company, Cleveland, Ohio, U. S. A. Power machines for large scale work are also available. Dusting machines have a very great advantage over sprayers, in the fact that no water comes into contact with their working parts, and hence rust and corrosion are avoided.

CHAPTER III.

SEEDS—SEED-SOWING—POT-CULTURE—PLANTING AND TRANSPLANTING—CUTTINGS—LAYERS—GOOTEE—GRAFTING AND INARCHING—BUDDING—PRUNING AND ROOT-PRUNNING—CONVEYANCE.

SEEDS.

Plants may be propagated in two ways : (1) by seed, (2) by vegetative means such as cuttings, layers and grafts. Propagation by seed differs essentially from vegetative propagation. The seed is a case containing an embryo plant. This embryo plant is the result of the union of male and female germ cells, just as an embryo animal is. The plant, however, is *born* (if one may use the term) in a resting condition, either containing or surrounded by a store of food on which it draws when awaked by moisture. If a seed is kept perfectly dry, it will not germinate, nor does it suffer from extremes of heat and cold. When completely dry, it is also less susceptible to attack by weevils. The most important operation of seed storage is the preliminary drying of the seed.

Vegetative means of propagation consist in removing a part of the plant, such as a stem, leaf or root, and putting it in such a situation that it renews its missing parts. A plant propagated vegetatively produces offspring true to itself. A plant propagated by seed may occasionally show the influence of a mixed parentage by the variation of its offspring from the parent. This may be one of the cause of the degeneration of certain foreign plants when grown in India for several years, without the introduction of fresh foreign seed.

Many plants, however, do not degenerate, and it is desirable and economical to collect one's own seed for next season's sowing. First, one must select the plants from which seed is to be collected. These plants should be the best of their kind in the garden, in shape, colour, fragrance, profusion of leaf, blossom or fruit, and length of season. The flower or flowering shoots should (if the weather is dry) be enclosed in muslin bags and removed when ripe. If the weather is wet, muslin bags form a damp covering to the fruit and cause it to rot. They should be omitted in wet weather.

Ripeness in dry fruit is usually accompanied by loss of succulence, gain of a peculiar colour, and opening of the fruit. In pulpy fruits ripeness is indicated by high colour and softness. Dry fruits when ripe should be removed and spread on paper in the sun until they open, when the seeds are removed by hand. With dry fruits that open explosively, it is well to retain them inside the muslin bags till they open so that the seeds are not ejected to a distance and lost. The seeds of dry fruits should then be thoroughly dried by exposing them to the sun for three successive days, storing them in air-tight tins in the intervening nights. After the final drying the seeds should be put in a dry air-tight tin along with a ball of naphthalin, and the lid soldered or waxed on. The tin is then labelled and set aside for next season. It is desirable not to mix seeds of different colours of an ornamental plant. One may desire to arrange a particular colour scheme, and this is impossible if the colours are mixed in the seed collection. Glass bottles if perfectly dry and with the corks sealed in are as good as tins.

Pulpy fruits should be gathered when showing signs of over-ripeness and allowed to rot. When the pulp is rotten, squeeze and wash it away from the seeds and dry the seeds on blotting paper in the shade for three days, and in the sun for three more days. The seeds are then stored as above described.

If seeds are kept merely in envelopes or matchboxes, or some such receptacles, they are liable to the attacks of insects and the effects of damp.

Where the seed of culinary vegetables is easily obtainable from Europe or America, it is not advantageous to save any from the garden, except it be of peas, beans, onions, mustard and cress, and in Lower Bengal artichokes and cauliflowers, which in that locality, when raised from imported seed, are rarely productive, as the produce of what is termed acclimated seed is unquestionably very inferior to that of imported. Onion-seed seems to retain its vitality a much shorter time than any other vegetable seed ; hence imported seed sometimes germinates very scantily, and frequently not at all. In Upper India, likewise, whither the conveyance of heavy seeds like those of peas and beans involves a considerable expense, an abundant supply of the seed of these vegetables may be saved from the garden each year in succession, without the proudce raised from it being found much, if at all, degenerate. Care, however, must be taken that the finest seed be saved, and not that merely which is left, after the best has been gathered for table use. When a person is dependent entirely upon his own garden for his pea-seeds, he should make sowings, the produce of which is to be reserved exclusively for seed.

In India certain foreign ornamental plants, such as antirrhinums and certain economic plants, such as potatoes, fail to set seed or set only a little. Seeds of these plants must be imported yearly.

A good sample of seeds should—

(1) be true to name ;
(2) contain no dirt or rubbish ;
(3) contain no dead seeds (*i.e.*, have a high germination percentage ;

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(4) germinate quickly (*i.e.*, have a high germination energy).

The death of seeds, or rather of the embryos in seeds, may be due to one or more of the following causes :—

(1) Collection of seed when immature.
(2) Damage to seed in extracting it.
(3) Insect attack.
(4) Damp.
(5) Old age (if seed kept too long).

It is of great importance that, before being gathered, seed be fully developed and perfectly mature. When this is attended to, the preservation of its vitality, under the most trying circumstances is quite astonishing. An instance whereof may be seen in the length of time that it will remain unharmed even in sea-water, as stated by Charles Darwin ; "Until I tried, with Mr. Berkeley's aid, a few experiments, it was not even known how far seeds could resist the injurious effects of sea-water. To my surprise I found that out of eighty-seven kinds sixty-four germinated after an immersion of twenty-eight days ; and a few survived immersion of a hundred and thirty-seven days."* Firminger says "Of the intense degree of heat they have the power of withstanding I once, too, had a notable proof. A small tin-box of seeds of annuals was sent me from England. On opening it, I found that the head of the soldering-iron had scorched to a dark-brown colour several of the paper packets in which the seeds were put ; whence I concluded that the seeds must of necessity have been destroyed ; on trial, however, I found them not in the least injured, as they germinated freely. An instance, again, of their capability of remaining long without taking harm, alternately in a dry and wet condition may be witnessed in what takes place every year in most gardens in this country. The seeds of several of the European annuals, such, as larkspur, mignonette, phlox, petunia, sweet-pea, etc., will fall when ripe, and lie for some two or three months exposed to the influence of a breaking sun, and then for the three or four months of the rains which follow remain embedded in the swampy soil ; and yet afterwards, on the arrival of the cold season, germinate and spring up vigorously."

The seeds of different plants differ very much in the length of time for which they may be kept. All our annuals will keep a year, cereal crops keep from two to five years, but mango and citrus seeds keep only a month or at most six weeks. The longest time for which seed has been proved to keep its vitality is 105 years. These seeds were of *Hovea linearis* and were tested in Australia by Ewart from museum specimens. There are, of course, tales of seeds having survived longer than this, but there is no scientific evidence for such statements.

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* Origin of species.

Naphthalin is a most effective means of keeping insects from attacking seeds. One-fourth of a naphthalin ball in a cigarette tinful of seeds will kill all existing insects and prevent further attack.

Certain seeds, especially some belonging to the classes Leguminosæ (pod-bearing plants) and Malvaceæ (cotton class) have extremely hard-coated seeds. Of these *babul* (*Acacia arabica)* is a striking example. Fully ripe seeds of *babul*, if sown in the ordinary way, give a germination of 4 to 10 per cent. If soaked in concentrated sulphuric acid for six hours, a germiation of 70 to 90 per cent is secured, and a similar result is obtained by rubbing the seed in a mortar with sharp gravel. Big hard seeds which are not so thick skinned as the *babul* should be soaked in hot water of a temperature easily tolerated by the finger, and left there for twelve hours. The water cools and need not be re-heated. Small seed not hard-coated need not be soaked. It has been found by actual experiment in India that seeds of *mug* (*Phaseolus radiatus*) and *naid* (*Phaseolus radiatus* var. mungo) when newly harvested contain large percemtages of "hard" seeds, which do not germinate. After keeping such seed for one year, however, the "hardness" disappears of itself and nearly all the seeds germinate. The reason for this improvement on keeping is not yet discovered.

Sutton's Seeds are largely imported into India where they deservedly bear an excellent reputation.

With each consignment will be found the following printed note :—

"In accordance with our established rule these seeds before packeting have been proved by repeated tests to be of the highest germination. They have, moreover, been specially prepared for exportation by an improved process of our own, which will ensure their perfect condition for many months if the tin is unopened.' Failure can only occur from exposure to the atmosphere before sowing time, unsuitable condition of soil, or ravages of insects.

We strongly recommend that the following hints be borne in mind :—

Open the tin when the atmosphere is clear and dry.

Seeds required for immediate sowing should be put into the ground without unnecessary exposure to the atmosphere beforehand.

It is found to be no longer necessary for peas and beans packed by our system to be soaked before sowing, but if the soil is not sufficiently moist, regular watering must be practised.

Seeds not at once to be sown can be best preserved by putting them into bottles tightly corked. It is of course essential that the inside of each bottle be free from damp."

Seed somtimes proves valueless from having been consigned to this country at the wrong season. No seed should arrive here long

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before it is the right time for sowing it; otherwise, though perfectly sound on its arrival, the risk of its becoming bad before being put in the ground is very great. In Bengal this is especially the case; and seed intended to be sown at the commencement of the cold season, that arrives a month or two previous perfectly sound and good, will, if opened and left exposed to the action of the humid atmosphere, be all but sure to fail.

Seeds, however, that in reality are perfectly good when sown are often pronounced to be bad, for one or the other of two reasons: *First*, from having been sown too soon in the season they have not germinated at the time they were expected. Many of the annuals—Nemophila, and larkspur, for instance—will not germinate readily, if at all, till the cold-season is thoroughly set in; and if sown earlier, will lie dormant in the soil till the due time arrives. Celery-seed, again, that is sown in August (as it should be for cultivating the vegetable) will come up but very sparingly, after having been more than a month in the ground; whereas portions of the same seed, reserved till the cold season and sown then, will come up plentifully in about twelve days.

Second, seed sown in the open ground is often judged to have been bad from its having shown no growth; whereas the whole sowing, soon after it was made, has been destroyed by vermin. In some localities, where red-ants abound, if lettuce-seed or the small seed of any of the annuals be sown, in a very few hours scarcely a grain will escape being made away with by these destructive insects. The seedlings of some plants, moreover, particularly those of a succulent nature, such as beet, Nolana, the ice-plant, etc., are very liable to be eaten up entirely by sparrows, even before it is observed that the seeds have germinated.

The following methods of testing the age of seeds—especially of culinary vegetables—are recommended by the *American Agriculturist*, and will be found useful in the cases noted: "When you want new seed peas, put one from the stock into your mouth and bite it. If it is very hard, it is more than one year old. If the teeths enter it with moderate ease, it is new seed. New carrot-seed always has a green shade on it. Old seed loses this, and is of a dead, pale brown, and less fragrant. New parsnip-seed has a shade of green, which it loses if more than one year old. Onion-seed is more difficult to prove than most other seeds. But if you take a single seed at a time and carefully bite it, you will find that old seed has a tough dry skin, with a very white and harsh kernel, while new seed has a more tender, moist skin, and the kernel possesses a greater degree of moisture, and is somewhat oily. The seed may be cut with a pen-knife instead of bitten. Onion-seed that has no vitality at all has no kernel, or one perfectly dry. Test this by pressing the seed on a piece of white writing paper. If it leaves no moisture on the paper it is of no use, and has been tampered with, or has lost its vitality by age. New cabbage and broccoli-seed possesses a pale green shade in the kernel when pressed out or cut, and a tinge of green in the brown skin also. But old seed loses this in proportion to its age, becoming of a dull, dark brown. Cabbage, broccoli, kales, etc., will retain their vitality longer than any other seeds, and will go well when three years old, or even six years, if well kept. Beet-seed has a faint tinge of pale green if new, but is a dull brown if old, and its vitality is very doubtful if old. New celery-seed has a faint tinge of green, and is very aromatic, but it loses the green and becomes less fragrant if more than a year old, and is doubtful."

SEED-SOWING

The best method of sowing will, to some extent, depend upon the kind of seed to be sown. Directions for the sowing of seeds of flowering annuals and culinary vegetables will be given in the sections dealing with these plants. In the meanwhile, the following suggestions in a general way may, perhaps, be found useful.

When pots or seed-pans are used, about the best soil for sowing seeds in, and the one most generally available in this country, is one-part leaf-mould, one-part common garden-earth, and an eight-part sand or very fine gravel, well mixed. A light soil for covering the seeds with may be made of equal parts of coarsely-pounded charcoal and leaf-mould. If the seeds remain long before they germinate, the charcoal will have the tendency to keep the soil from becoming green and sour, as it so often does from continued watering.

The depth at which a seed should be sown is roughly as great as its own diameter. The bigger the seed, the deeper should it be sown. For small seeds, therefore, it is better to sprinkle them on the surface of the seed, pan and then sift the pounded charcoal and leaf-mould over them. There are exceptional cases, however, where seeds can germinate far beyond the depth just mentioned. Ordinary maize, for example, germinates if buried up to 2½ inches deep and forces its way to the light. The Navajo Indians, however, possess a peculiarly drought-resisting variety of maize which not only germinates but also forces its way to the surface when sown at a depth of six inches.*

It is laid down as a rule by some of the best gradeners in this country, as well as elsewhere, that seeds should always be sown in what is called a "dry bed." Mr. R. Scott at the Calcutta Botanical Gardens used, during the hot months, to lay up under a shed, and sheltered from wet, a store of dry earth, that he might have it, as he said, in a perfectly dry state on all occasions for his sowings. Mr. J. Newman of the Botanical Gardens at the Mauritius, says:—

"I find that all seeds, particularly those that have come a long voyage, ought to be sown in moist, but not *wet* earth, and not watered

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* "Journal of Heredity," Vol. V, No. 6, p. 258.

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for three days after sowing. In wet weather it is advisable to have matting to cover the seed-beds until the plants have appeared above ground, when they may be watered as usual. By this simple precaution, even many old seeds will vegetate ; whereas seeds sown in wet earth, or watered immediately, frequently rot, by having so much water at first. I have tried seeds from the same packet in a dry place and a wet one at the same time, and it requires only one trial to prove the superiority of the former."*

Firminger remarks "This certainly does not accord with what has been my own experience ; nor in the North-Western Prvoinces would it be altogether practicable, on account of the dryness of the climate, and of the light surface-soil, with the seeds in it, being liable to be blown away by the wind. The practice, which I have found uniformly attended with success, has always been except when moist enough not to need it, to drench the soil immediately previous to the sowing.

"I should certainly hesitate, however, in recommending this practice had I not the sanction of those whose opinions on such a matter ought to have far greater weight than my own. Mr. R. Ross formerly head gardener of the Botanical Gardens, says in his directions for the sowing of seeds : 'When sown, give a little water, with the fine rose of a watering pot : afterwards keep damp, but not wet.'† And Mr. M'Meekin, formerly head gardener of the Agri-Horticultural Society, speaks of his success in raising annuals from actually flooding the ground 'when the seeds were sown,' a treatment which Mr. John Scott strongly condemns as opposed to theory and practice. ‡ And lastly Mr. John M'Elroy directs even for the humid climate of England : 'before you sow the seed, let the soil be well soaked with water.'§ It appears to me that if proper attention be given to drainage, the only effect of the soil being in moist condition when the sowing is made, is to soften the hard integument of the seed and thus enable it to germinate the more speedily. Unless the soil be drenched to excess, so as to be kept in a sodden state, it will be found, except perhaps during the rains, to dry up far too soon for the seed to rot through wet."

Seeds need warmth to assist their germination and should not be denied the heat and light of the sun. This, however, should not come from one side of the seedlings lean over towards that side and become long and leggy. A light roof of split bamboo is a first-class protection, giving a certain amount of shade and no side light. If

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* "Transactions of the Agri-Hort. Society," Vol. II, p. 76.
† "Journal of the Agri-Hort. Society," Vol. V, p. 1.
‡ "Journal of the Agri-Hort. Society," Vol. I, New Series, p. 192.
§ "Gardener's Magazine," conducted by Shirley Hibberd, for 1866, p. 296.

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seedlings do not get plenty of light, they grow up into weak stemmed plants that soon topple over and die. The watering of beds and pots in which seeds are sown needs special care. Where the seeds are very small, the best way is to stand the pot in a dish of water and let the water rise up in the soil by capillarity. An alternative method is to protect the surface of the pot with fine-leaved twigs, which will break the force of the descending water-drops. The watering-can should have a fine "rose" and be held high in the air.

POTS AND POT-CULTURE.

For the cultivation of some of the choicer kinds of plants, as well as for seed-sowing, pots are absolutely necessary. As utensils of earthenware, similar to that of which flower-pots are made, are in universal use in India, potters are always to be met with. Hence pots may, nearly everywhere, be easily obtained to order, at a very reasonable rate. The pots, however, vary much in different localities as regards the goodness and durability of the material of which they are made. Some soon break to pieces by any little force applied to them, or crumble away by exposure to weather; while others have a ring like that of a bell, and last uninjured for a great length of time. Much depends, probably, upon the quantity of salt existing in the earth of which they are made. It is advisable to have a large stock in hand of all sizes. These should not be allowed to lie out, neglected and exposed to the weather but should be stored neatly away, somewhere under cover, ready for use when wanted. Any old pots, likewise, when out of use, should be immediately well washed and put away. Uncleansed, dirty pots are condemned by all good gardeners.

For the sowing of seeds, broad and shallow pots are obviously the best adapted. In the bazars wide, round pans, somewhat of a pie-dish form, may commonly be met with at a very cheap price, excellently adapted for the purpose. They must, before being used, have a small hole broken through the bottom for drainage. Pans of this description without the hole are also of the greatest use to hold water for pots with aquatic plants to stand in.

SEASON FOR POTTING

With regard to the season most suited for potting, the following very important directions are given by Sir J. Paxton :—

> "There ought to be no such thing as a fixed period for universal potting. Each specimen ought to be treated according to its individual wants. No specimen should be re-potted till it begins, or is about to begin, growing. *
>
> "Potting is too frequently determined by date of month instead of by progress of the season and state of vegetation.
>
> "It is an infallible maxim that plants should not be re-potted till some enlargement or development of their organs is apparent.

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* "Magazine of Botany," Vol. X, p. 48.

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"Early potting is injurious to plants. Water is liberally supplied when they are wholly unprepared for its absorption. Thousands of tender plants are annually thus destroyed. If the potting be deferred till vegetation has commenced, plants will imbibe and evaporate the water applied with all requisite facility. They will receive no check if the potting be skilfully executed.

"By potting at proper period, the appearance of the plant will indicate the nature and extent of its subsequent growth, and the size of the pot required. *

"Ordinary plants producing numberless fibrous roots which are rather benefited by nearness to the outside of the pot, should be often and very gradually shifted.

"The only circumstance which can justify re-potting is a decided indication of growth. Woody and herbaceous species must, like the Orchidaceæ, never be potted till they show signs of advancement.

"A few exceptions may be made in the case of tuberous-rooted or bulbous perennials, which may be potted immediately before the period at which they usually form roots, as it is necessary to take away the dry soil in which they have been preserved, and to supply them with fresh till they can be watered freely."†

Notwithstanding the unquestionable accuracy of the above remarks, it so happens that in India there are special seasons suitable for removing most kinds of plants. As a general rule for guidance, it may be observed, that plants that are natives of a cold climate, and that are in the full vigour of their growth during the cold season in this country, should be re-potted at the commencement of the cold season—some time in November; and that plants that are natives of India or of a similar hot climate are best re-potted either in February, at the commencement of the hot season, or about the end of June, at the commencement of the rains.

The necessity of re-potting a plant, if the pot that it is in be not unmanageably large, may be easily determined by turning the ball of earth entire out of the pot, and examining the roots. This is done by passing the base of the stem through the middle fingers of the right hand, and then turning the pot upside down, and knocking the rim of it gently upon the top of a wall, or upon the edge of a table, till it can be lifted clean off by the left hand. "It is a standing principle," says Sir J. Paxton, "with experienced culturists, that no specimen should be allowed a larger pot till the one in which it is growing is filled with fibrous roots; and that subsequent shifting be trifling and oft-repeated, in preference to only one or two abrupt transitions annually. This is one of the prime secrets in the right management of flowers—the *sine qua non* to distinguished or even common success in cultivation." ‡

"If the soil," he further says, "be closely compressed into a hard mass, it must be shaken from the roots. For this put the base of the ball on the ground, and strike gently all round with the

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* "Magazine of Botany," Vol. VI, p. 71.

† Ibid., Vol. VIII, p. 47

‡ "Magazine of Botany," Vol. VII, p. 35.

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hand. All plants that are thus freed from earth, ought not to be planted in large pots."

OPERATION OF POTTING.

When plants are merely to be removed from one pot into another, if the operation be at all carefully performed, they will suffer scarcely the slightest check in consequence. But if plants be dug up from the border to be potted, they require some little attention to be paid to them afterwards, on account of the injury almost of necessity done to their roots. The best plan is to put them, as soon as potted, in a dark room or godown during the day, and bring them out into the open air at night. By this mode of treatment they will mostly recover themselves in two or three days.

Plants, again, that are purchased of native nurserymen or dealers, are nearly always delivered with their roots kneaded up in a ball of dense, clayey kind of earth. If the plants be potted in this condition, just as received, it will probably be many months before the roots will be able to overcome such impediment to their free growth. One way of removing this dense clayey ball, without in the least injuring the root, is to immerse it in a vessel of water. In about an hour's time it will dissolve and loosen away, and upon the plant being shaken, leave the roots quite free and clean. The plant should then, without a moment's delay, be potted—care being taken to press the soil close round the roots, and then to supply a copious watering. The plant should be removed to a dark room, to be kept there during the day, and put out at night, till found that it can bear the light without flagging.

In preparing a pot to receive a plant, the first thing to do is to put in it broken pieces of potsherd, charcoal, or old mortar or concrete—the last for preference—to the height of fully an inch and-a-half for the purpose of drainage. Care must be taken that what is placed immediately above the hole be a crooked piece of potsherd, and not a flat piece of tile, such as mâlees often lay on, thus effectually closing the hole, and impending drainage. Above the layer of broken potsherds or charcoal spread a small quantity of dry moss (if to be had), cocoanut fibre, dead leaves or any similar material, to prevent the soil that is to be put in from immediately falling into and clogging up the drainage below. For the information of those who do not understand the operation of potting, the following directions are given :—Having got your pot ready with the material for drainage, and having the soil handy, take the pot containing the plant to be re-potted, and upset it on to your right hand palm passing the stem of the plant through the second and middle fingers ; then gently knock the rim of the pot against any hard substance until the ball of earth containing the roots rests loosely on your palm. Then remove the pot with your left hand. If the soil round the roots has

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become a hard mass, stand it in a basin of cold water if in the summer, and in tepid water if in winter, until the roots are quite free from the earth. Then, having filled in sufficient fresh soil into the new pot so as to allow the roots to rest on it, and leave an inch space at the top between the rim of the pot and that portion of the stem immediately above the soil, hold the plant to be potted in the left hand in the new pot, taking care to have it as much as possible in the centre : then having gently spread out the roots in the pot, commence filling in the fresh soil, giving the pot an occasional shake to allow the soil to settle firmly round the roots, until within an inch of the rim. Then press down the soil, firmly but gently, so as not to injure the roots. Having done this, knock the bottom of the pot once or twice on the potting table, and then give a copious watering with a fine rose, afterwards place the newly-potted plant in a shady situation, where the sun's rays cannot get to it, until it begins to show signs of starting into new growth, when it may gradually have sunshine. This method of potting, if carefully followed, results in a high percentage of success. The same process should be followed in the case of plants, the roots of which are not in a hardened mass, with this exception, that only the superfluous soil and crocks are to be removed before placing the plant in the new pot. It is a good rule never to allow the soil usually found pressed round the roots of plants purchased from itinerant native plant dealers, to remain, but have it always removed by soaking the ball of earth in water. Whenever you find a potted plant in an unhealthy condition, change it into a fresh pot and soil. There are, of course, certain conditions to be observed ; such, for instance, as to whether the plant is too much in shade or too much in the sun, whether the soil is too wet, or too dry below the surface, etc. But the remedy of potting afresh gives the plant a new start, and if the surrounding conditions are made right, healthy growth will result.

The soil best adapted for the general run of potted plants is common garden-loam with which are well mixed and incorporated about one-eighth part by weight of vegetable mould, the same quantity of well-rotted cowdung, and a little sand. To keep the soil open, nothing better can be mixed with it than a small quantity of garden-refuse, charred and broken into rather small pieces ; or old mortar or concrete, broken into pieces the size of peas and hazelnuts.

WATERING OF POTTED PLANTS

There is no operation in horticulture that requires judgment more than the giving to a plant just the amount of water beneficial to it, and no more. If too little be given, the plant will be starved and stunted ; if too much, it will rot and die. As a general rule, the quantity of water a plant demands depends entirely upon the more or less vigorous state of growth it is in at the time. When observed to be making no growth, only just water enough should be given to keep it alive; when showing symptoms of starting into growth, then is the time to supply water with a liberal hand.

It is during the rains, in districts where rainfall is heavy that the greatest difficulty is experienced. Plants that are natives of a cold climate, especially herbaceous ones an perennials, such as Geraniums, Carnations, etc., at this season, though in all but a dormant condition, cannot exist in a soil that is perfectly dry; and yet, when kept under shelter, are very apt to perish from the soil turning rank and sour, however little the water supplied. When the drainage of the pots in which such plants are grown is perfect, the plants will sometimes do even better put out and fully exposed to the rains; for in that case, the soil, though constantly drenched, does not become sodden with wet, nor ever otherwise than sweet and wholesome.

In watering plants, especially young delicate plants, it is advisable to use a watering-can with a fine rose. The ordinary roses attached to cans sold in the bazar are worse than useless for watering potted plants with, as the water rushes out with so much force as to cause considerable damage to the roots. It would be worth while having a brass rose specially made with very fine holes, which could be attached to any watering-pot. A little expense incurred in the purchase of a few really good cans, will save the lives of hundreds of plants. The same remarks apply with equal force to the watering of seed-pans and seed-beds. Unless the water applied falls on them in a very fine shower, seeds are either washed out completely or driven deep into the soil, being lost in either case. It is a common sight to see a mâlee flooding a pot with water from a watering-can that has no rose on it. This torrent of water applied from a narrow tube at the same spot day after day gradually excavates a hole round the root of the plant and in addition compacts the surface soil and sweeps away all its nutritive material. It cannot be too strongly impressed upon mâlees that it is the roots of the plants that require water, and not the flowers or leaves, to which they often so injuriously apply it. The only object in casting water upon the leaves is to cleanse them of dust and dirt, so as to keep open their pores for respiration. But the pores being situated principally upon the under-surface of leaves, the dashing of water upon them from above is not a very effectual mode of operating.

The only perfectly effectual mode of cleansing the foliage of a large plant is frequently (once a week, perhaps) to wash each individual leaf carefully with sponge and water above and below. But upon this subject attention is invited by Dr. Lindley :—

"It is well known to gardeners that the efficiency of leaves is much promoted by their being kept clean. The great cause of the unhealthiness of plants in towns is the amount of dirt which unavoidably collects upon their surface. If such impurities are constantly washed off, plants will grow as well in cities as in country places. This was found experimentally by M. Garreau, who, in the course of his inquiries into the functions of the skins of plants, found that soap and water had great value, plants well washed acquiring a power of absorption much beyond what they possessed in their unwashed condition. It was found that soap and water had a far greater cleansing effect than mere water; thus a fig-leaf which had been lathered absorbed 90 parts, while after a mere water-bath it took up only half the quantity; and a bramble, which soap and water provided with 130 parts absorbed, could only consume 10 parts when cleansed with water alone. It was thus shown that perfect cleanliness is as indispensable to plants as to animals, and that dirty gardening is necessarily bad gardening. Plants breathe by their leaves, and if their surface is clogged by dirt of whatever kind, their breathing is impeded or prevented. Plants perspire by their leaves, and dirt prevents their perspiration. Plants feed by their leaves, and dirt prevents their feeding. So that breathing, perspiration, and food are fatally interrupted by the accumulation of foreign matter upon leaves. Let any one, after reading this, cast an eye upon the state of plants in sitting-rooms, or ill-kept greenhouses; let them draw a white handkerchief over the surface of such plants, or a piece of smooth white leather, if they desire to know how far they are from being as clean as their nature requires. Half the business of good gardener consists in sponging and washing the leaves of his plants." *

It is worth remembering that there is no place where plants are more liable to get into a filthy condition than where those of the choicest kind are usually kept, that is, in the verandah of a house. This place, as well as the ground immediately in front of it, is swept out every morning by the mehter, when a fresh and abundant deposit of dirt upon the leaves of the plants is the inevitable consequence. How deleterious this must be to many of the Orchids which in their native homes live high up on trees far out of the region of dust and dirt, may easily be conceived.

The method of sponging leaves can only be applied in the case of a few large plants. In an establishment with many small potted plants sponging is out of the question, but a weekly syringing in the early morning or the evening is beneficial.

Sir J. Paxton advises "to maintain a regular supply of moisture, and likewise obviate the necessity of pouring water on the soil, so as to endanger the rotting of the plant at its base, each pot should be furnished with a pan filled with water. Specimens are preserved sometimes in this way with the greatest security, as the mere application of water to the surface of a pot, in which a delicate plant is growing, often causes it to decay at the juncture of the stems and roots." † A modification of this plan was used by Firminger and

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* "Theory and Practice of Horticulture," p. 58. 2nd. Ed.
† "Botanical Magazine," Vol. VIII, p. 227.

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found highly advantageous, especially with flowering annuals, in the month of February, when the weather begins to become hot and dry. At that period though the mâlee, when not watched, often does little more than just sprinkle the surface of the soil, still by any amount of watering from above, it would be almost impracticable even so much as to damp the roots at the bottom of the pot.

Several earthenware glazed pans, of the same depth as the flower-pots, are procured from the bazar. These are filled with water just so full that, when a flower-pot is placed in one of them, the water rises up to a level with the rim of the flower-pot. Each flower-pot may be allowed to remain immersed about six hours, by which time the water will force itself up through the hole at the bottom of the pot, and thoroughly saturate the whole contents of the pot.

All the pots are thus placed in the water-pans in succession, and watered effectually. A plant that has been thus treated will not require water again for three or four days. There need be no fear of the plants suffering from water lying stagnant at their roots, concerning which such strong cautions are usually given by those who insist upon the necessity of thorough drainage, as the water will dry up by evaporation long before it has time to stagnate. An advantage, moreover, resulting from this mode of occasionally watering potted plants of all kinds is, that the action of the water, forcing its way upwards, tends to loosen and lighten the soil, counteracting that compression to which it has been subject, from the daily beating down upon it of water from the watering-pot.

Sometimes, when water has to be fetched from a distance for watering potted plants, a bhistee is emyloyed to go round with the mâlee to refill his watering-pot from the *mushuk*, immediately that it becomes empty. This will be found a very bad arrangement. The bhistee, to get the work over as soon as possible, when not observed, will water the pots himeslf from his *mushuk*, and thus, by the violence of the water dashed down upon them, often destroy tender and valuable plants. This difficulty was got over in one case by purchasing from the bazar an earthenware vessel, the largest that could be procured, capable of holding, perhaps, four or five *mushuks* full of water. This was sunk to the rim in a spot close to where the potted plants were placed, and the bhistee directed to fill it every afternoon with water. The mâlee dipped the watering-pot into it when he pleased, and supplied himself without difficulty or delay. The earthenware vessel must have its sides supported by being sunk into the earth, or it will soon break to pieces by the weight of the water within it.

For seedlings of avenue trees and similar plants in pots, a system of economising water has been practised for some years with success in the Ganeshkhind Botanical Garden, Poona. The method is as follows:—In November, when the rains are over, trenches are made 1 foot deep and 3 feet broad. The trench bottom is made firm by ramming. Pots are arranged in the trench touching each other. The space between the pots are loosely filled with dry leaves, and dry leaves are piled over the pots, to make a flat surface. This surface is watered twice a week from a watering-can with a rose. The amount given is just enough to wet the surface of dead leaves. Labour and water are thus saved and the plants kept in ideal conditions. During the rains the plants are taken out of the trench, as they would get water-logged in it. The dry leaves rot during the rains and become leaf mould. They are used as such and a fresh lot employed for the next dry season.

DRAINAGE OF POTTED PLANTS

There is no point the importance of which is so strongly insisted on by all gardeners as the drainage of potted plants. The usual means, however, adopted for the purpose prove in this country often utterly ineffectual ; the materials placed at the bottom of the pot, such as pieces of brick, charcoal, and potsherds, failing to act in the way of drainage altogether. For, in the first place, during the hot season, from the constant daily watering that is indispensable, the upper portion of the soil in the pot becomes so dense and compact, that no water, however, liberally supplied, makes its way down to the drainage, or even to the soil for some height above it. A partial remedy for this is to lay flat broken pieces of potsherd, old mortar or concrete, or small clinkers, over the surface of the soil. The water then falls with all its force upon these, and trickles between them into the soil below, without any great tendency to solidify it and render it impervious. And again, during the rains, if potted plants be put out, with the bottoms of the pots resting upon the ground, or, indeed, upon *any flat* surface, no water will ever pass out of them from below. Upon this point one may easily satisfy oneself by merely placing out an empty flower-pot in the rains. It will soon become filled with water, which will remain in it very many days, till dried up by evaporation. Such being the case with an empty pot, how much more is it likely to be so with one that contains anything within it.

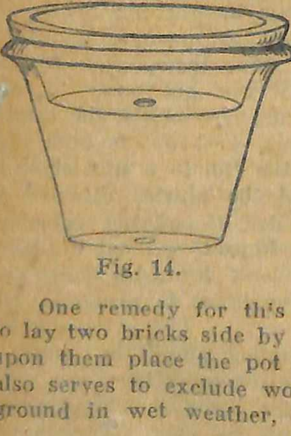

Fig. 14.

One remedy for this is, of course, very obvious, being merely to lay two bricks side by side, about three or four inches apart, and upon them place the pot with the hole just half-way between. This also serves to exclude worms, with which, when pots rest upon the ground in wet weather, they soon become filled. Another remedy is to have pots made with drainage holes round the side, about an inch from the bottom.

For *Begonias, Achimenes,* and choice and tender plants of that description, which require the shelter of a verandah, an excellent method, as shown in Fig. 14, is to procure a shallow pan for the plant to grow in, and to drop it into a flower-pot, about double its depth, so that the rim of the pan rests exactly upon the rim of the flower-pot. By this means drainage is rendered effectual, and insects are excluded.

Dwarf choice plants, such as *Tetranema,* it is always desirable to grow in pots correspondingly small. To prevent the fluctuations of temperature consequent upon speedy evaporation in pots so small, it is usual to plunge them in larger ones filled with sand.

PLANTING.

SEASON.

Planting consists, for the most part, in transferring young shrubs or trees from the pots, in which they have been growing into the places in the open ground where they are to remain permanently. This, with many plants of a robust nature, may be done almost equally well at any season. But the two seasons especially suited for the operation are the setting in of the rains, and the commencement of the cold season. As a general rule, it may be laid down that plants, natives of this country, are planted out most successfully just previous to their breaking for their summer growth, a little after the commencement of the rains; while plants, natives of a colder climate and that are in the greatest vigour of growth during the cold season, such as roses, for instance, should be planted out about October. Most plants of the former class may, however, be planted out in February, but in that case those of a less robust habit demand a vast deal of attention, both in sheltering them from the sun, and in keeping them well watered during the hot months. In districts of excessive rainfall, trees planted at the break of the rains and subject to wet soil conditions while they are getting used to their new surroundings may perish. In such districts the end of the rains or beginning of the cold season is the most suitable time. Thorough stirring and mulching of the surface soil after planting will check loss of water from the soil and enable the plant to make use of the rain water stored in it.

PREPARING THE GROUND.

The usual method with mâlees, if not looked after, when planting out a young shrub or fruit-tree, is to dig a hole in the ground only just large enough to receive the ball of earth in which the roots are contained; whereas the proper plan is to dig the hole as much as two feet in diameter, and a foot and-a-half deep, for moderate sized

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shrubs, three feet each way for fruit-trees, and four feet each way for well-grown avenue trees. In excavating a 3′×3′ ×3′ hole keep the soil of the top one foot at one side and with it mix ten pounds farmyard manure (dung and litter), two and-a-half pounds bone meal, and three pounds wood ashes. The soil from below one foot deep should be mixed with ten pounds farmyard manure, two and-a-half pounds bone meal, and four pounds wood ashes, returned to the hole and well rammed with a small eminence in the middle over which the roots of the tree can be spread. Soak with water. Place the tree in position and arrange the roots. One man should hold the tree and another shovel in the top soil, compacting it gently and firmly as the pit fills. The soil should finally be rammed all round the tree and soaked with water, the leaves sprayed, and a shelter built to shade the tree for a month in dry weather. The soil will need watering once in three days, as a rule.

There are few things in which the mâlee will manifest his indolence more than in transplanting. If not keenly watched, he will, to make easy work of it, begin digging round the plant close to the stem, so that the ball of earth he has to take up may be as small as possible, cutting through or tearing away all the large long roots that come in his way, rather than carefully extracting them.

In lifting a plant great care and often much patience are required, so that the roots sustain the least possible injury. It will sometimes, however, unavoidably happen that the roots become so much broken or disturbed in the operation that the plant would suffer severely, if removed at once to the spot intended for it, and immediately exposed to the sun and air. In such case it will be found advantageous to put it into as small a pot as will contain it, fill in the pot with soil and well water it ; then convey it to a shady spot and keep it there during the day, bringing it out in the evening to remain in the open air and receive the benefit of the dew during the night. After a few days it may be left out in half-shade during the whole day, and in no great length of time, when its wounded roots have become healed, it will bear any amount of exposure. It may then be shifted from its pot, and planted in the place where it is intended to remain. The worst it will have suffered will be merely the temporary shedding of its leaves.

A method said to be employed by the Japanese, and used with success by one Public Works Department subordinate in the Ahmednagar District of the Bombay Presidency, is to wrap the trunk and larger branches of the transplanted tree with straw and keep this straw moist. By this means a bulky shelter is dispensed with and quite large trees may be transplanted.

A tree of over one foot high requires pruning both of roots and stems when being transplanted. The tap root and the straggling roots are shortened and about one-third of the left surface removed. If there is only one stem, and it is desired to retain the terminal bud, then one-third of each leaf may be removed.

PROPAGATION.

When dealing with seeds, the nature of propagation by vegetative methods was briefly mentioned. Let us consider this rather more fully. Vegetative propagation occurs in nature. In the strawberry we have a plant sending out long branches trailing on the soil. The stimulus of moisture causes the production of roots below a bud on a long branch, the bud begins to shoot, and soon the connection between the new plant and the old is severed by the withering-up of the intervening branch. Again, the agave (usually called aloe) produces at the end of its life a tall pole on which are set small bulbils. These fall off and rapidly produce roots becoming new plants. Each bulb is simply a bud packed with food materials. Take again the case of Bryophyllum, wild at Mahabaleshwar and elsewhere, known in Marathi as *Panphuti*, i.e., the leaf that shoots. From the little angles of the edge of its scolloped leaves buds begin to grow and rapidly root when the leaf falls on the ground. We can imitate the natural propagation of Bryophyllum in our leaf cuttings of Begonia, the natural propagation of strawberries in our artificial layering of climbers, and the natural propagation of agave by our artificial cuttings of many plants. These various methods will now be considered in detail. It should be mentioned, however, that in layering there is little or no interruption of food and water supply from the mother to what will be the new plant, while in cuttings the new plant-to-be is cut off entirely from the mother, and must depend on its own contained food and water. In this respect the so-called soft-wooded plants with an abundance of water in their succulent tissues have an advantage over the so-called hard-wooded plants, with little contained water.

LAYERS.

Propagation by layering, though generally speaking, a slower process than by cuttings, is a much surer one, for there are few plants which, when in a thriving condition, cannot be multiplied by this method. Larger and more advanced plants may be obtained by layers than by cuttings.

The operation is as follows :—Select a branch of ripened wood of the plant to be layered that will bear being bent down to the earth without breaking. Cut the branch half through with a sharp knife just under one of the leaf-buds towards its extremity, and then pass the knife upwards, so as to slit the branch about an inch or two up. The slit-piece, with the leaf-bud at its extremity, called the "tongue", should be kept open by inserting a small piece of tile or a match. Remove the earth to the depth of two or three inches from, or place a flower-pot over, the spot just where the tongue falls on the branch being bent down ; then carefully bend the tongued part of the branch into the earth or into the flower-pot ; secure it in that position by a peg, and cover it over with earth, which should be pressed down and watered. It is recommended to head down the branch when layered ; but this is not always done. If the layer is put down in the month of February or March, it is very essential that the soil be frequently watered and never allowed to become dry and hard. What Mr. Rivers enjoins with regard to the layering of roses may be considered applicable to all layered plants. "Have the tongue at upper part of the shoot, so as not to be in the part which forms the bow, as it is of consequence that it should be within two inches of the surface, so as to feel the effects of the atmospheric heat. Unless this is attended to, the roots will not be emitted quickly."*

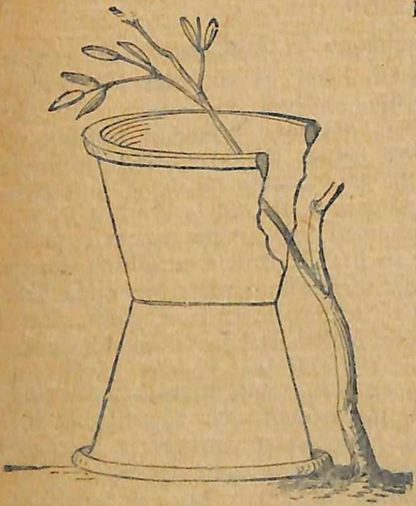

Fig. 15

A modification of the above process, represented in Fig. 15, has been attended with great success in layring some kinds of roses and other plants, the boughs of which are too rigid to be bent down :

Procure a flower-pot which has had part of its side broken out, make a tongue in the branch to be layered, as before directed. Raise the flower-pot up so that the branch, passing through the broken side, may have its tongued part just about two inches below the level of the soil, when the pot is filled in. Keep the flower-pot permanently in this position by some support placed beneath it ; insert a piece of tile in the pot where the side is broken away ; and then fill in with a mellow soil composed of leaf-mould and sand, which must be kept constantly moist.

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* "Rose Amateurs' Guide," p. 153.

The time when roots have been formed from the cut surface in the pot may to some extent be gauged by the vigour of growth of the part beyond the cut. In any case it is safe to leave the layer intact for two months and then gradually sever the connection of the layer with the parent. This is done by cutting a small notch in the branch between the pot and the parent plant and deepening it every second day. A fortnight will suffice to sever the plant completely.

For layering any herbaceous plant which roots quickly, such as a Carnation, an ingenious plan is given in "Le Bon Jardinier." A piece of oiled paper is folded round the stem to be layered, so as to form a funnel, and held together with a couple of pins. Soil is inserted into this, and retained therein by moss thrust into the mouth and kept constantly moist.

A better plan is to have four-inch pots divided into halves vertically like tiles. Pass the branch to be layered through these, tie firmly together, and fill in with good soil. Continue watering regularly, and in six weeks or two months fine plants will be the result. A modification of this is known to Indian gardeners as the Gootee.

GOOTEE.

The mode of propagation by Gootee is thus described by Mr. Masters, formerly head gardener in the Calcutta Botanical Gardens :—

"Select a firm, healthy branch, the wood of which is well ripened ; and immediately under a leaf-bud take off a small ring of bark, about one inch wide. Scrape the woody part well, so that no bark remains. Apply a ball of well-tempered clay ; bind it on securely with a tow or other soft bandage ; make it fast to a stake, if necessary ; hang a small pot, having a hole in the bottom, just over the Gootee ; and supply it with water daily. In a few months you obtain a fine well-rooted plant.

"As the fibres are emitted from the buds that are above the wound, they will descend into the ball of earth and form roots. As soon as they are seen protruding themselves through the bandage, the branch may be cut off from the parent tree (the cutting should be done progressively), and planted where it is intended that it should remain. This appears to be the most expeditious method of obtaining strong well-rooted plants, and, at the same time, is a sure method of procuring duplicates of any desirable variety. Of sixty-five Gootees, made in June, of the *Jonesia Asoca*, the whole were well-rooted in October ; while of forty-five layers made at the same time, and on the same individual tree, none were well-rooted, and some only just beginning to form. The *Leechee* requires four months to form good roots" *

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* "Transactions of the Agri-Hort. Society," Vol. III, p. 2 and Vol. VI, p. 18.

Unless some precaution be taken, the water in the pot above the Gootee will flow out too fast, and very often not fall upon the Gootee at all. To obviate this, therefore, the following contrivance, as in Fig. 16, is commonly resorted to :—

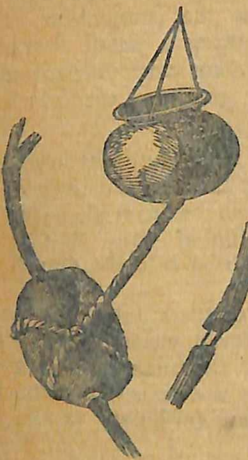

Fig. 16.

A piece of rope has a knot tied at one end of it; the other end is passed within the pot and drawn through the hole at its bottom till the knot is brought down to fall upon and close up the hole. The rope, thus secured by its knotted end within the pot, is carried on at full stretch and coiled round the Gootee. By this means the water, when poured into the pot, oozes slowly out, trickled down the rope and along the coil, and so distributes itself over the whole Gootee.

The Gootee is termed "Marcotee" in America. In addition to the plants mentioned, it is also successfully employed for the *pomelo* and the *sapodilla plum* (*chiku*).

CUTTINGS.

SEASON.

Some plants may be propagated by cuttings at nearly all times of the year, but the majority most successfully in the rains. Some of our choicer plants, natives of a cold climate, and that are in vigorous growth only in the cold season, cannot be multiplied by cuttings successfully except at that season.

Cuttings, for instance, of *Stephanotis* strike readily in the rains, and cuttings of *Habrothamnus, Aloysia,* and *Verbena* in the cold season; but put down the former in the cold season; and the latter in the rains, and in neither case will they succeed.

DESCRIPTION.

Some cuttings strike so readily that it is almost immaterial how they are put into the ground. But most cuttings, it has been ascertained, strike more readily by being inserted sloping-wise into the ground, than when they are planted upright. Indeed, it is well to lay them so sloping-wise that their summits be not more than an inch high above the ground, and the earth up and cover all but the two uppermost buds. The cuttings thus protected are not nearly liable to become dried up and to perish, as when almost their whole length is left exposed to the air. The rooting end is also better aerated.

The end of the cutting which is to be inserted in the soil should be cut across with a clean cut just below a leaf-bud (Fig. 17*a*). Some gardeners are of opinion that slips strike more readily than cuttings. A slip is a small shoot pulled off a plant at its point of junction with the stem, bringing away with it a heel of wood and bark from the stem (Fig. 17*b*).

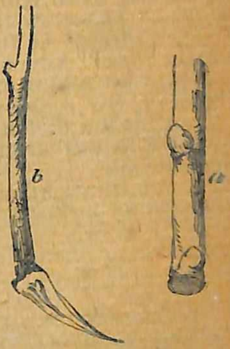

Fig. 17.

None of the leaves, or as few as possible, should be removed from the upper end of a cutting (as in Fig. 18).

The age or condition of the wood from which cuttings are most suitably taken varies according to the nature of the plant to be propagated. On this point Sir J. Paxton observes :—

"Some propagate freely by—

1. Cuttings of the young and tender wood : as *Melastoma, Barleria, Astrapaea, Inga, &c.*
2. When the wood begins to assume a brownish colour, or is half ripend as *Ixora, Bauhinia, Passiflora, Ruelia, &c.*
3. Some only strike freely when the wood is perfectly ripe ; as *Grevillea, Vitis,* and *Rosa, &c.*"*

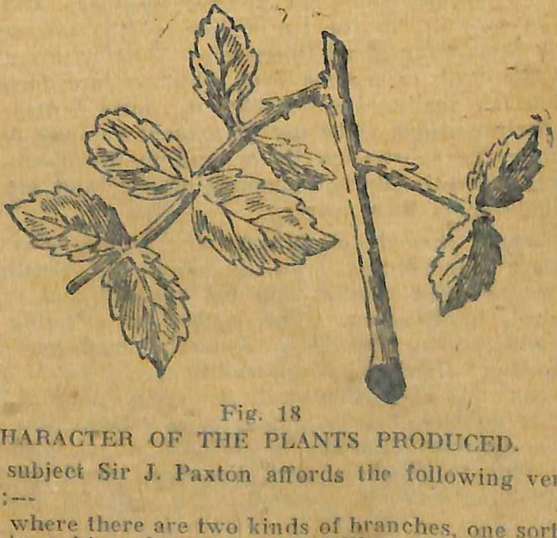

Fig. 18

CHARACTER OF THE PLANTS PRODUCED.

On this subject Sir J. Paxton affords the following very valuable information :—

"In plants, where there are two kinds of branches, one sort ascending and another branching along the ground like runners of Strawberries.

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* "Magazine of Botany," Vol. II. p. 55.

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the difference is much the same as that between common shoots and suckers in ordinary shrubs and trees.

"The lower trailing shoots, employed for propagation, form plants very like those from suckers ; healthy, vigorous and disposed to occupy a large space, without blooming.

"Cuttings of the upper shoots produce flowering laterals in a very short time. And a fine blooming specimen may even be raised in one season by taking off the extremities of the longest shoots as cuttings. Indeed, the dimensions and early blooming of the plant may be regulated by the distance at which the cutting is taken from the main stem.

"Cuttings from the extremity flower speedily, and in a dwarf condition.

"Cuttings taken from a shoot in an early stage of its growth will constitute larger specimens, and be longer in bearing flowers." *

METHODS OF STRIKING AND SOIL.

Success in propagation by cuttings, according to the late Professor Bayley Balfour,† depends on (1) maintaining an adequate water-supply in the cutting, until it is able to absorb for itself, (2) applying stimuli to encourage the development of the new water-absorbing organs—and in other cases to promote the development of the shoot, (3) securing adequate aeration of the rooted end of the cutting.

A large number of the plants can be raised from cuttings laid down in common garden-soil during the rains in an open situation without shelter either from sun or wet weather. And possibly a situation thus exposed to the full action of the atmosphere is the very best for them ; for of all things most baneful to cuttings is that tendency in the earth to become sour, which occurs during the rains, in situation at all sheltered and secluded. Some Indian nurserymen in striking their cuttings make use of a mellow soapy description of clay, seemingly the substratum thrown up in the cleaning of tanks. This appears to be singularly tenacious of wet, and yet to have no tendency whatever to turn sour.

To propagate the choicer kinds of plants, however, a more careful mode of proceeding must be adopted. Cuttings of these put down in the open ground will not succeed, but require to be struck in sand, under glass. The method of effecting this on a large scale, adopted by Mr. Ross, formerly head gardener of the Calcutta Botanical Gardens, is described by him at considerable length in the "Agri-Horticultural Society's Journal," Vol. II, p. 384. This method, briefly stated, is as follows :—A small piece of ground in an open situation is enclosed round with a wall two feet high. This is filled in with the finest sand procurable. In the sand the cuttings are inserted, well watered, pressed down,

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* "Magazine of Botany," Vol. VIII, p. 205.
† "Gardener's Chronicle," Nov. 23, 1912, p. 385.

covered with bell-glasses, and shaded with a roof of matting, fixed about two feet above them. "The glasses," Mr. Ross says, "are not to be taken off more than once or twice weekly to give water, and keep the cuttings clean of any decayed leaves."

An improvement upon this plan is to fill small pots with sand, place the cuttings close around the inside of them, sink the pots to the rim in the bed of sand, and cover them with bell-glasses. When the cuttings are struck, the pots may be taken out, and other pots with fresh cuttings fitted into their places. In this way, when the cuttings are removed, the bed of sand is not disturbed, as it would be were pots not employed. Moreover, it is maintained, that cuttings strike far more readily by being laid in contact with the sides of the pots.

Of course, the same end may be obtained by more simple means than the above ; for, except in point of convenience, the result will be the same if the pots of sand, with the cuttings in them, be sunk in the earth in any suitable spot in the garden, and there covered with bell-glasses and shaded.

One of the simplest modifications of the above plan is to fill a flower-pot half-full of sand ; insert cuttings of length sufficient to reach, within a little, the rim of the pot ; sink the pot in the earth and cover with a pane of glass. Each morning the under-side of the glass will be covered with condensed moisture ; all that is required is to turn it upside down. Sir J. Paxton states ; "Mr. Mearns first recommended this, and found it answer so well that he greatly prefers it to any other covering." *

The sinking of the pots to the rim Firminger considered of great importance ; as one point essential to success in striking cuttings is that the soil in which they are inserted should, if anything, be of a somewhat higher temperature than the surrounding atmosphere. Whereas if the pots be left above ground, the evaporation that takes place through their porous sides must necessarily much reduce the temperature of the soil within them, and so be very prejudicial to the cuttings.

Mr. Errington, sometime head gardener of the Agri-Horticultural Society, once stated that of some thousands of cuttings he put down one year in pure sand most succeeded ; but that in the following year nearly all that he so put down failed. He, therefore, had adopted the material employed in the Botanical Gardens, which he said, uniformly proved efficacious ; that is to say, three parts of sand to one of fine charcoal. This, then, in all cases will be the material safest to use.

Bell-glasses were not easily procurable in this country some years ago, and, therefore, a very cheap and effective substitute for them

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*"Magazine of Botany," Vol. I, p. 159.

was easily obtained from any tinman in the bazar. This consists simply of a four-sided glass lantern with the bottom removed, and a roof of glass instead of the tin one. The apertures between the glass and the tin frame-work must, of course, be well closed up with putty.

For the propagation of cuttings, the following contrivance, of which a representation in section is given in Fig. 19, is useful.

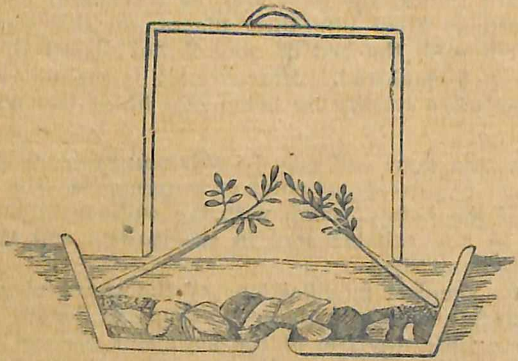

Fig. 19.

Procure a wide, shallow pan, and lay at the bottom of it a quantity of crocks, potsherds, etc., for drainage. Over the drainage, near the circumference, put a layer of equal parts of leaf-mould and sand, and then fill the pan to within half an inch of the rim with pure sand. Put in the cuttings, with their bases against the side of the pan, just above the mixture of leaf-mould, and sloping, so that their summits project out of the sand in a small circle in the centre of the pan. Then put down a hand-glass just large enough to enclose the circle of leafy ends. Sink the pan to its rim in the earth in some shady place, and water the sand outside the hand-glass daily. Place a piece of matting over the whole at night to prevent the effect of cold from radiation, which would be very injurious.

The above plan has the following advantages :—

1. The bases of the cuttings are laid where it is recommended they should be—against the side of the pot or pan.

2. Being laid very-slopingwise, the cuttings are well covered from the air without their lower ends being too deep in the soil.

3. The hand-glass need not be taken off till the cuttings are struck.

4. The pan being sunk in the ground, no cold is caused by evaporation from its outer side.

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When neither bell-glass nor hand-glass is procurable, the following as shown in section in Fig. 20, is simple and efficacious.

Procure a large flower-pot, and lay at the bottom of it large loose pieces of brick just so high that a small flower-pot placed inside upon them may have its rim on the same level as the rim of the large pot. Fill in the interval between the pots with perfectly dry sand or earth. Fill the inner pot with pure sand, and insert the cuttings. Take another pot just of the size that, when turned upside down, it may fit in on the earth between the rims of the large and small pots. Break out its bottom, and lay over it a piece of window-glass. Water the cuttings as they require it with tepid water allowing none to fall on the earth between the pots. When condensation takes place upon the pane of glass, merely turn it over. The object in keeping the earth between the pots dry is, of course, that no evaporation may take place from the outside of the large pot, and the temperature within be thereby reduced.

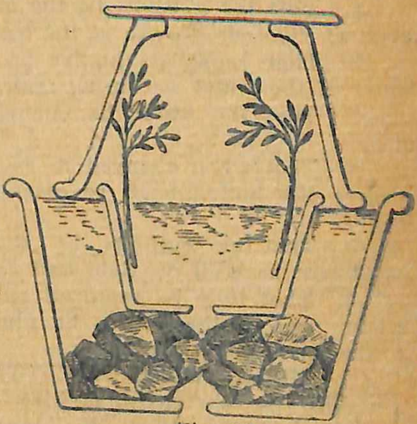

Fig. 20

THE STRIKING OF CUTTINGS IN WATER.

This, Dr. Lindley says, is an old practice, and quotes a communication to the *Gardener's Chronicle,* to show the manner of it :—

"I tie vial-bottles by the necks, and hang them in the windows of our small green-house, having filled them with clean soft water. I then put in slips of Salvia, Calceolaria, Mimulus, Myrtle, or anything I wish to propagate of the same description of plants. In about two or three weeks or a month, the little silver-like roots appear and in a week or ten days I plant them in small pots well watered ; they never seem to flag or mind the change, and I rarely lose a slip." *

Furthermore, Sir J. Paxton observes :—

"The cuttings should be of green wood, taken during the full-growing season ; such succeed best, and never flag beneath a hot sun. Very young spring-shoots of Erythrinæ succeed in this way. When tubular or fibrous roots appear about the base, transfer to any light soil. Balsams and Dahlias propagate freely. Plants of the melon tribe may be formed in a very short period (sometimes in three days), and being transferred to small pots of health-mould will produce perfect balls of roots in less than a week." †

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* "Theory and Practice of Horticulture," p. 297, 2nd Ed.
† "Magazine of Botany," Vol. IV, p. 182.

Firminger practised this method during the cold season with Verbenas, Habrothamnus, Salvia splendens, and Roses, and found no method more successful or less troublesome. The points to be attended to as most conducive to success he concluded to be the following :—

1. That the cuttings be the summits of the youngest shoots in a state of vigorous growth at the time.

2. That capacious bottles be used, so that there be less likelihood of the water becoming foul.

3. That the water be changed often to insure its being quite pure.

4. That when changed it be tepid, so as to afford in some degree the bottom-heat, so essential for the speedy formation of a callus.

5. That the cuttings be sheltered from wind and sun, but otherwise have all the light and air possible.

6. That they be removed out of the cold air into the house at night ; and if the bottles be plunged half-way up in a tepid bath, probably so much the better.

THE STRIKING OF CUTTINGS IN SAND AND WATER.

This is obviously nothing more than a modification of the practice last described, the sand answering no purpose but the mechanical one of supporting the cuttings. Firminger tried this method during the cold season, and found it in many instances completely successful. A few remarks by Miss Maling are given on the subject, only first observing that for cuttings of plants which take a long time in striking, the sand must be absolutely clean and pure ; otherwise it will turn green and sour, and the cuttings rot in consequence :—

"Heliotropes, Verbenas, Lobelias, and Begonias do most beautifully, as do any of the very young soft shoots when planted in pans of silver-sand soaked and overflowed with a little sheet of water. Many hard-wooded plants, even hard to strike by other means, will grow in this way well.

"The shoots, taken off as short as possible, and as fresh, and having only the lowest leaves snipped off, if necessary, near the stalk (not close to it) may be stuck in all over, and if a warm and sheltered place, as over a greenhouse stove, will grow most rapidly, and make the most charming bunches of little fibry roots. These things will often strike even in small bottles of little fibry roots. These things will often strike even in small bottles of rainwater, the convenience of which is that they take up so little room. Previously to drawing out little plants, it is well to soak the sand thoroughly to avoid tearing the rootlets. The cuttings raised in sand must, as a rule, have their roots filled in with sand when they are first removed." *

Cuttings show by their vigorous growth from the buds above the soil, that they have *struck*, i.e., produced roots. They can then be transplanted to their permanent positions.

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* "The Indoor Gardener," pp. 117, 121.

PROPAGATION BY EYES.

Many plants may be propagated very readily by eyes or buds. It has been mentioned elsewhere that this method has been adopted with great success with the Grape-vine at Lahore, and there is no reason to doubt that it would prove equally successful with many other plants in India. The method is simply to take a plump shoot of the season, on which the leaves are healthy and the buds not yet started. About half an inch or less above and below a bud, cut the shoot sloping-wise into the wood, so that the cut each way may meet just about a quarter of an inch behind the bud. The piece of the shoot, with the bud upon it just as it is, is planted firmly in a pan of sand, with the point of the bud just visible above the surface. It is essential that the bud have a leaf attached to it, which should not be taken off. The sand is kept moistened and the pan covered with a pane of glass. This is a practice that has long been employed in England in raising plants of the Orange tribe, and has proved equally successful with Camelias and Roses.

DIVISION

There are many shrubs and perennials, such for instance as the Chrysanthemum, which increase by throwing up numerous rooted stems from the ground. Plants of this habit are propagated easily to almost any extent by what is called "division". This consists in taking them out of the ground and pulling the stems asunder, each one bringing with it a portion of the roots. These stems planted out soon establish themselves as separate plants. Indeed, with plants of this habit the process should be often adopted, whether needed for propagation or not, as the habit itself indicates an effort of nature in the plant to move away to fresh soil from that which it has already exhausted.

GRAFTING.

Grafting is the art of uniting a part of one plant to another which will afterwards nourish it. The part so united is called a *graft* or *scion*, and the plant which nourishes it after union is called the *stock*. The art of grafting is an old one. Readers of the Bible may recollect St. Paul's sustained simile of the grafting of the wild olive tree on to the good olive tree (Romans XI, 17—24). The general practice, which St. Paul deliberately inverts, is to graft a good scion on to a wild tree. The aims of grafting are these :—

(1) to change the character of an existing tree;
(2) to propagate a plant that is uncertain from seed or cuttings ;
(3) to secure dwarf trees.
(4) to secure heavily bearing trees.
(5) to secure fruiting quickly.
(6) to multiply plants rapidly.

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The stock and the scion influence each other, but not always in a striking manner. Thus the character of the mango stock seems to be of little significance, but all citrus species are not equally good stocks.

Grafting can be done only between allied varieties of species. One cannot graft an orange scion on a mango stock, but one can graft a lime scion on an orange stock and vice versa. The following are some methods of grafting.

WEDGE-GRAFTING.

For this the scion and stock must be very nearly of the same thickness and age. Select a vigorous stock, and "head" it to within about six or eight inches of the soil, and prepare it as at *a* in Fig. 21, cutting cleanly with a sharp knife. Then get the scion, and prepare as at *b*, and fit it into the stock firmly. It will be quite sufficient if *one* side only fits in square; but take care *never* to separate scion and stock after they have once been fixed, as then the graft is sure not to be a success. Having fixed scion and stock, tie up the junction with some cotton basting, or plantain fibre, and smear over with the grafting-wax prepared according to the recipe given further on or with a mixture of equal parts of fresh cowdung and garden soil. If the graft can be kept in a situation not exposed to the sun so much the better. In about six weeks the graft will be a well-established plant.

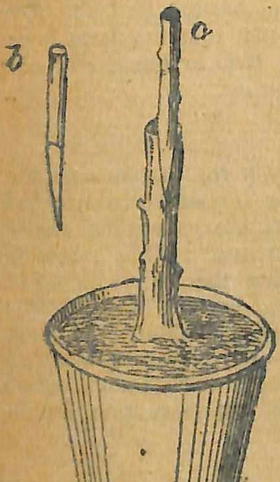

Fig. 21

SIDE-GRAFTING OR THE "NURSERYMAN'S GRAFT."

For this, the scion and stock need not be of the same thickness; indeed, it is essential that the scion be much thinner than the stock. It is not necessary to "head" down the stock. Having secured a healthy stock, make a clean cut with a sharp knife longitudinally, about half an inch deep; then from about an inch and a half above the cut, slice away the bark with a portion of the wood, thus leaving a small opening wedge-shaped. The stock is now ready for the scion, which prepare by flattening at both ends, exactly wedged-shaped, and insert into the tongue-like slit in he stock.

Then bind up and the graft is ready, after which bind and paint it over with the grafting-wax. This will be found a very easy and successful method.

CLEFT-GRAFTING.

For this also the scion does not need to be of the same thickness. In fact, the stock must of necessity be two or three times as thick as the scion. Head down the stock to within eight inches of the soil, cutting off and making a perfectly level surface. To make the cleft in the stock, you need a fine-toothed saw. Prepare the stock as at *a* in Fig. 22, and to keep it open, ram in a wooden wedge as at *b*. Then prepare your scion as at *c*, in the shape of a wedge, and insert it as at *d*. The inner bark of the scion should meet that of the stock. This method is generally adopted when it is desired to utilize an existing plant some years old, which is not considered of value and upon which it is usual to graft two scions. In binding this graft, it is necessary to wrap it round with wax-cloth first, then bind with bast, and paint over with the grafting-wax.

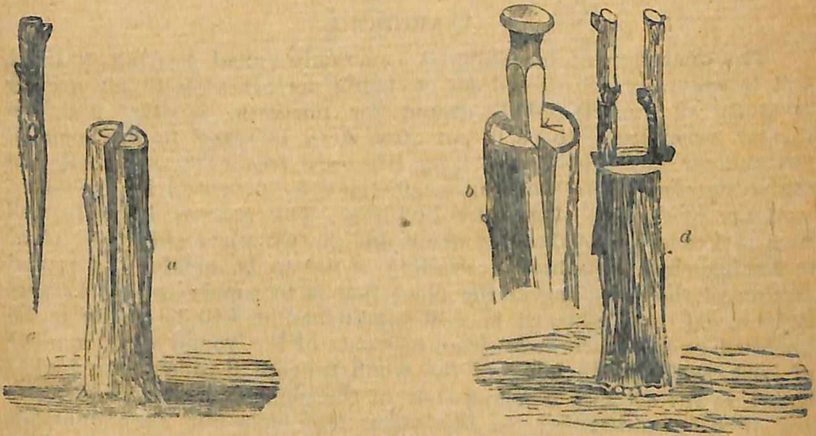

Fig. 22.

CROWN-GRAFTING.

Head down the stock as in cleft-grafting. With a sharp pointed knife make a slit six inches long in the bark from the cut surface downward, cutting as deep as the wood and no deeper. Ease out the bark on either side of the cut by pushing in first a thin and then a thick wooden wedge between the wood and the slit. The scion is then cut off the tree and its leaves removed. Its lower end is trimmed on two sides as in the figure. It is then inserted behind the slit. The whole of the cut surface and the trunk are covered with sacking tied on tightly by string and mud plus cowdung

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smeared thickly over it. A grass cone should be built to protect the graft with a small opening to the north to admit light. Two scions may be inserted if the trunk is large. The method is useful for renewing old trees of poor quality. *See* Fig. 23.

GRAFTING-WAX SOLUTION.

Melt together equal parts of beeswax and resin. As this is an inflammable mixture, it is well to do this over a water bath. Allow to cool till it can be touched with the fingers and to every two pounds of this mixture add a pint of alcohol, mix well and put up in tightly corked bottles. Apply with a brush.

GRAFTING-WAX.

Heat together 6 lbs. resin, 2 lbs. beeswax, and 1 pint linseed oil over a water bath. Stir well, allow to cool, and preserve in a jar. Where something is wanted to smear on a union this is useful. Wet the fingers with linseed oil before handling the stuff.

INARCHING.

The operation of inarching is commonly called grafting in India and is generally substituted for it, being performed with far greater certainty of success; but, except for mangoes, sapotas, and, in Bengal, peach-trees, there is not often need to resort to it. Some of the choicer kinds of Roses, it is true, are frequently inarched, but with due care, more thriving plants may be procured by means of cuttings or layers, if not by budding. The process is performed thus :—Procure a seedling of about one or two years old of the plant to be inarched, or where a seedling is not to be obtained, a rooted cutting of the same age of the plant that is to supply the stock. Put it in a pot, and when it is well established it will be ready to be operated upon. Slice away from one side of the young stem a piece of bark, with a thin layer of the wood beneath it, about two inches long; do the same to a young stem of the plant to be inarched from, and then bring together the two stems that have thus been operated upon so that the cut parts lie close in contact, face to face, bandage them with cotton-twist and cover with grafting wax or earth and cow-dung mixed. After two months when the parts have united, head down the stock and dissever the scion from the parent plant by cutting it through below the bandage.

This cutting should be gradual. Make cuts at A1 and B1 (in Figs. 24 and 25) each reaching half through the branch and leave the plant for a fortnight. Then completely sever at A_2 and B_2. Plant A_2 and B_2 with tar. Keep the completed plant in shade for a month, then in half shade and finally in a place where it will get direct sun morning and evening. Thus it will be hardened for transplantation to the field. Twelve months after the making of the union the grafted plant is ready for the field.

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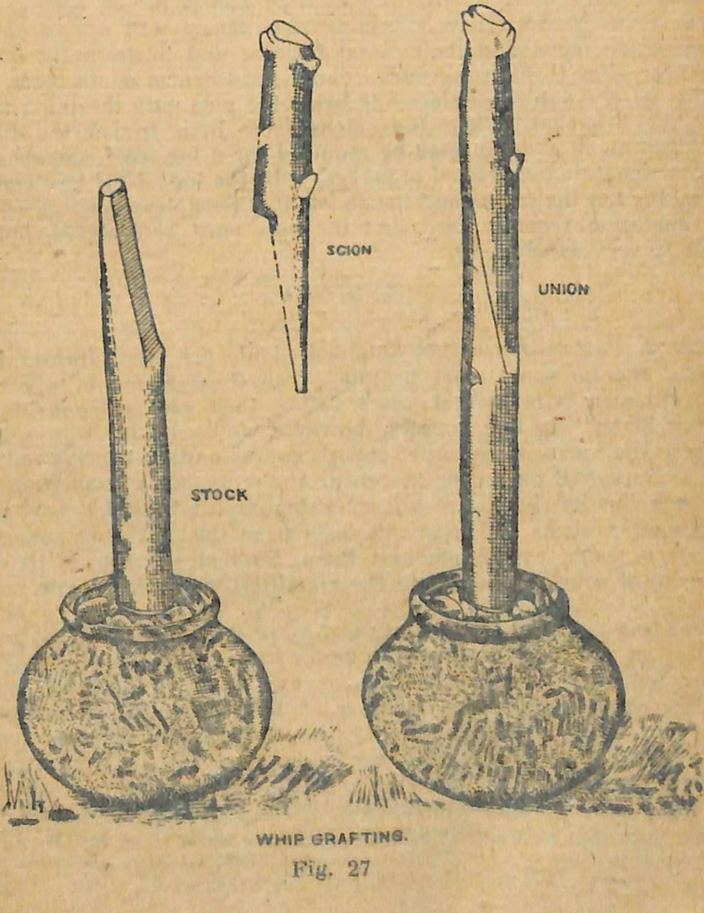
TONGUE-GRAFTING BY APPROACH.

A modification of inarching is "Tongue Graft by Approach." (*see* Fig. 26). In this method a tongue is cut in stock and scion and these are fitted together. There are thus three surfaces of contact. The method is preferable to simple inarching where a skilled operator is available.

WHIP-GRAFTING.

Whip-grafting resembles crown or side-grafting except that it is done on a one or two year old stock. The method is shown in Fig. 27. The stock is cut off and the top pared on a long slant,



WHIP GRAFTING.

Fig. 27

with a little part at the base of the slant left flat to support the scion. The scion is similarly pared and the two are united, tied in position and the union covered with mud and cowdung or grafting-wax. The after-treatment is important. Little water is given to the roots, but the surrounding air must be kept moist.

TOP-WORKING.

The complete renewal of the top of a tree of inferior quality, substituting for its own branches, those of a good variety, can be done by the process of top-working. This method is specially applicable to mango trees. It is as follows:—Select branches of about four inches diameter and remove a ring of bark two inches broad, cutting right down to the wood. Below this ring new shoots will spring up. Let these shoots ripen and their wood harden, and in from six months to a year after their appearance, inarch good scions on to them. This means the erection of platforms to bring the pots with the scion plants near the branches. When the scions have been transferred to the tree (and about a dozen may be required for a big tree) *gradually* cut out the remaining ungrafted branches, until the top of the tree consists of nothing but the scions and the shoots that have developed therefrom. The operation requires care, and the pots must be watered, but the result is very satisfactory.

BUDDING.

Sir J. Paxton states that "budded plants are more free in their growth, and no doubt more prolific, than those raised in any other way, although it is several years before they can be brought to a bearing State."* In this country, however, no such objection applies, for here they make most rapid growth and come into bearing quite as soon as those that have been inarched. At Ferozepore a small Mulberry-tree was budded in the month of February, and by October, eight months after, stems had been put forth from the bud stout enough to support a man's weight amongst them. Budded peach-trees likewise were almost equally vigorous in the growth of wood they made.

Budding may be performed upon any of the shoots of a full-grown plant if all the branches but the budded ones be cut away. But the proper method is to raise seedlings, or in the case of Roses, strike cuttings expressly for the purpose of budding upon. Seedlings of most plants will generally be ready for the purpose in about twelve months from the time the seed was sown. They will be the better for having been transplanted previous to the operation, either into the spot where they are to remain permanently or elsewhere; but they must have become thoroughly established before budding upon them be attempted.

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*"Magazine of Botany," Vol. IV, p. 61.

In the Upper Provinces the operation of budding is performed with great facility at two seasons of the year—first, when the plants are about to start for their Spring growth, and again when for their Midsummer growth, as at those times the bark separates most freely from the wood. But for some reason which Firminger was unable to explain, he did not find such to be the case in the vicinity of Calcutta; and he stated that budding could so seldom be performed there with success, that it was rarely or never attempted, inarching being uniformly adopted instead.

For the operation of budding are required a ball of cotton-twist, or strips of plantain fibre, a sharp penknife (or a prunning-knife) and a budding-knife. The last may be easily made of a thin piece of ivory, filed into the form and size of a lancet, and fixed in a wooden handle.

The time when the operation can be performed with success depends on the fit condition of the plant to be used as the stock. This can be at once determined by making a cut through the bark down upon the wood, and trying whether the budding-knife can be thrust freely between the bark and the wood. If the bark adheres firmly, so as only to be raised by tearing away, it is of no use to attempt to bud; but if the bark is found to yield readily, the operation may be safely commenced.

Make a gash through the bark across the branch in the place where it is to be budded, and from the centre of this gash make another gash, about an inch and-a-half downwards (Fig. 28*b*). The bud to be inserted must then be taken off the branch on which it is growing. Select a plump bud, and if, as is commonly the case, it has a leaf growing beneath it, cut the leaf off, leaving about a quarter of an inch of its stalk adhering below the bud. Then pass the penknife into the branch about half an inch above the bud, and slice down a thin piece of the wood with the bark and its bud upon it, bringing the knife out at about two-thirds of an inch below the bud. The bark with the bud upon it is called the shield (Fig. 28*a*). Before inserting it, it is desirable that the wood adhering to it be removed; and to do this without injuring the eye of the bud is a matter of some little nicety. But it may be done without risk of failure by holding the shield in the left hand and thrusting the thumb nail of the right hand between the wood and bark of the upper part of the shield, and then removing the wood from the bark by pulling it off downwards, carefully keeping the bark all the while quite erect and inflexible (Fig. 28*b*). By adopting this plan a little wood may be left behind, but there is no fear of the eye being damaged.

For those who find a difficulty in removing the wood from the shield, it may be well to mention that it is by no means essential to do so; that some gardeners never do it, and even condemm the practice. They say that the wood assists to keep the bud moist, and prevents its being destroyed by the heat; and that by inserting the bud, just as cut from the shield, the operation of budding is rendered for more easy, more speedy, and proves uniformly more successful.

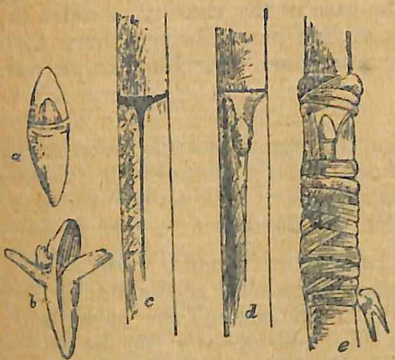

Fig. 28.

As soon as possible after the shield is ready, the longitudinal gash that has been made in the branch must be lifted open with the budding-knife and the shield slipped down so as to lie upon the naked wood of the branch similarly situated as it was upon the branch from which it was taken (Fig. 28*d*). Then cut half the part of the shield off, that is above the bud with a cross-cut, so that the upper part of the shield may lie close and even against the cross-cut of the branch; then bind the whole round firmly, but not tightly, with cotton twist, or plantain fibre, leaving the bud exposed (Fig. 28*e*). The first indication of the bud having taken will be the falling-off of the little bit of leaf-stalk that was left adhering to it. When the bud has pushed forth about a quarter of an inch, the cotton binding should be removed; but the branch should not be headed close down till the bud has sent forth a considerable shoot.

For budding oranges, Dr. Bonavia recommends what he says is the native method, namely a longitudinal gash only, and no cross-cut, on the stock. He directs that the buds be inserted on the north side of the stock, as being the most shady. "Bend the stock towards you, so that the incision may be at the bottom of the curve. By so doing, the edges of the incision can be lifted from the wood with the greatest ease by means of the point of the knife. When the incision is gaping, introduce the shield. Twist a thin slip of dry plantain leaf, previously wetted above and below the bud."*

It has been found that wood containing eyes for budding, if packed carefully in moss, may be sent a journey of many days, and prove as serviceable for the purpose as freshly cut wood. In this simple way new Roses are now easily procured from the most distant parts of India. Rose bud-wood has been sent to Allahabad even from England, and thus several new Roses were introduced. Citrus bud-wood has been successfully sent from America to India packed in moist sawdust.

"Journal of the Agri-Hort, Society," Vol. XIV, p. 200.

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Budded plants are for some time very liable to have the branches broken clean off by strong winds at the point where the bud was inserted. To guard against this stakes should be driven in the ground, to which the branches should be tied.

PRUNING.

FRUIT-TREES.

The pruning of fruit-trees is dealt with under the headings of the trees concerned. The general principles are these: In the first three years, in most cases, the framework of the tree should be built up. Thereafter pruning must be used to give each fruiting branch room, to induce free fruiting, and to keep the tree within limits. It follows that one must understand what shape is best for a given tree and where its fruiting growths appear.

FLOWERING-SHRUBS.

Nearly all plants of this kind are greatly benefited by being pruned closely in after they have done flowering. They break out again with vigour and blossom in a much more compact and handsome form the following season. The appearance of the plants also is vastly improved, and their tendency to flower freely increased by their being kept as much as possible to one stem clean of branches for some little height above the ground.

ROOT-PRUNING.

This, as applied to various fruit-trees, is a very old practice in India, though the principle upon which it is performed appears to be but very imperfectly understood.

The mode of proceeding in this country is the very reverse of that practised in England. Instead of removing the earth at some distance from the tree and cutting away the ends of the roots there, the practice in India is to open the soil immediately at the base of the stem, clear away some of the small roots, and after a week or two fill in with manure and cover over again with soil. This, though apparently opposed to theory, is, in fact, most effcacious in practice. The trees treated thus bear prodigiously. It is probable, however, that the life of the trees is shortened by this practice.

Mr. Rivers remarks: "The object constantly had in view is to make fruit-trees healthy and fruitful by keeping their roots near the surface. The root-pruning and biennial removal, so earnestly recommended, are the proper means to bring about these results, as they place the roots within the influence of the sun and air. The ground over the roots of garden-trees, as generally cultivated, is dug once or twice a year, so that every surface-fibre is destroyed and the larger roots driven downwards."* This object is completely effected by our Indian practice. On opening, as usual, the soil at the base of the stem each year, the large dense mass of fibrous roots that presents itself is often quite astonishing.

The object of the cultivator of fruit should be to encourage the formation of fibrous roots near the surface, and prevent the formation of woody roots in the sub-soil.

CONVEYANCE.

The importing of plants to this country, or the conveyance of them from any one part of it to another at a considerable distance, is generally attended with some trouble and not a little expense. Where, however, expense is not a consideration, unquestionably the best of all means of transmitting plants is in what is called a Wardian case.

A Wardian case is simply a strong wooden box, with a high-pitched roof fitted on to it. The roof is glazed with small overlapping panes of glass, across which rows of stout wires are fastened to protect them from being broken. One of the sides of the roof is made to screw on and off, for putting in of taking out the plants. The bottom of the case is filled with soil, in which the plants to be conveyed are planted very closely together for economy's sake. When they have become pretty well-established, they are watered moderately—not exclusively ; the side of the roof is screwed on, and the case is then ready for transmission.

It was formerly thought that these plant-cases should be hermetically closed ; but this of late has been found to be a mistake. The small amount of air that gains access to their interior through accidental crevices is considered rather beneficial than otherwise. The Wardian case patented by Mr. W. Bull, of Chelsea, is so constructed that the condensed moisture inside does not fall on to the plants in it. In fact, it is about as perfect a case as could be found, and is now very largely used.

A rough mode of conveying Rose-trees to this country from England, which has been attended with partial success, is as follows :—

An order is given to some nurseryman in England to send out a selected number of plants. In November, when they have become dormant, he pulls them up by the roots, without any earth upon them, lays them in a wooden box, packing them well in with dried moss, nails the lid of the box on, and so despatches them overland to this country.

The plants, as soon as possible after arrival, should be potted off, and their stems bound round with the moss in which they were packed. They should then be put in some shady place, out of the way of the wind, and be frequently watered all over.

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* "Miniature Fruit Garden," p. 4, 10th Ed.

But this withal is a very rude way of proceeding, involving to a certainty the loss of a large proportion. A modification of it for the conveyance of plants of nearly every description, adopted by a Mr. M'Ivor at Ootacamund and attended almost uniformly with success, was communicated to Firminger by him as follows :—

He writes to a nurseryman in England, some considerable time beforehand, what plants he desires to be sent out to him. The nurseryman cultivates specimens in very small pots, from which after a time he removes them, binds the roots, with as little soil upon them as possible, round with moss, and then sets them closely side by side. In this way they will grow vigorously, filling the moss with young roots. On the approach of winter, when they become dormant, watering is discontinued, and they are allowed to become quite dry. This is a point most essential to success. They are then headed down and packed with care closely in a wooden box. Nearly all the beautiful exotic plants with which the public gardens at Ootacamund are enriched were procured from England, by adopting this plan.

Upon this subject Mr. F. Halsey, of Amritsar, made the following important communication to the Agri-Horticultural Society * :—

"I have this year received three cases of plants from England,—one for myself, containing 14 Roses, Camelias, and many other plants, four were all but dead on arrival, and all are looking well now; and two for friends, one containing 40 Roses, and the other about 100, all of which were alive on arrival. With regard to treatment in Europe, the plants must be well-established with strong roots, and not despatched before the first week in December. The box in which they are packed should be made of deal, *well-screwed* together to prevent ingress of much air, the ends inside, where the roots lie, should be lined with zinc and coated inside with thick felt. Every row of Rose roots should be supported by a small deal batten, nailed to the sides of the box from the outside; the roots to lie in moist pulverised clay mixed with moss.

"On arrival at their destination in India the box should be opened in a dark, *moist* room, and each plant be potted ; the soil made light about the roots, but *not wetted for the first week*. Two or three times a day the top and stems should be syringed freely, but to avoid the water getting to the roots, the pots had better be laid on their sides, and the moister the atmosphere around them is kept the better. After the first week they may be removed from the dark room and a little water may be given them, until the plants show symptoms of growing. When once the plants commence growing, cut them back to four eyes of stem. But the plants must be kept in a moist place and syringed until they have quite got over their journey. The most important things to remember in this country are to give no water for the first week, and not to allow the sun's rays to fall directly upon the plants until fully established."

These directions, Mr. Halsey says, were originally given him by Messrs. Barr and Sugden of London. They are precisely the same

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* March 16, 1870.

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as Mr. S. Jennings, in a subsequent communication, states he received from the same quarter.

The clay and the zinc, it is obvious, must add considerably to the weight of the box, and consequently much to the expense of the carriage ; but far better this than incur the loss of so large a proportion as otherwise is all but sure to happen. The additional expense, moreover, would not amount to anything like the value of the plants that without it would be lost.

Mr. R. Lindsay, in a communication to the *Edinburgh Botanical Magazine*, mentions another most successful mode of transporting plants. This is merely to use the ordinary Wardian case, but instead of glazed sashes to use cotton cloth blinds, which are nailed to the top of the ridge and tied down with cords to the sides of the case, so that they may be rolled up or down as required. "The advantage of this method is the admission of sufficient light and air to maintain the plants in a healthy condition ; the fine meshes of the cloth act as a shade from strong sunshine, and do not admit so much air as to cause the interior to become quickly dried up." It was first used by Baron Von Müller of Melbourne, and proved very successful, almost every plant in a consignment sent in this way arriving in England in perfection after having been three months on the journey.

A cheap case devised by the Superintendent of the Ganeshkhind Botanical Gardens, Poona, and successfully used for transporting living plants overseas is made thus. The floor is of wood and on it are built partitions, each to take one pot with its contained plant. These partitions are as high as the pot. Each pot is packed with moss below, above and around and is held in position by wooden strips nailed on top of the partitions. The sides of the box are wood with a slit two inches broad on each side, on the inside of which is nailed expanded metal, allowing of free aeration. The lid of the box consists of spars nailed on two inches broad and with two inches space between each. After the case is nailed up, it is not opened till it reaches its destination. The case is kept on the deck of the ship, away from sea-water and watered daily with fresh water through the roof of the box. This package is as effective as a Wardian case, infinitely cheaper, and carries twice the number of plants in the same deckspace.

The native dealers keep their plants often a long time out of the ground, conveying them about for sale sometimes for a period of two or three months. To do this they knead up round their roots to a small compact ball the clayey kind of earth in which they grow them.

Fruit-trees and large shrubs may be dug up in the cold season and conveyed in native carts to a great distance, without suffering much injury, if they be occasionally watered during the journey. In this way very many plants are annually sent forth from the Saharanpore Botanical Gardens to different parts of the North-West Provinces.

When plants have become to a certain extent dried up from the length of time they have been out of the ground during their conveyance, it has been recommended as an excellent plan to steep their roots before planting them in a mixture of cow-dung and water of the consistency of gruel

M. Ysabeau says, what might be readily taken for granted, that shrubs, such as young Rose-trees, that have suffered from a similar cause, do well by having their stems and principal branches plastered over with a mixture of clay cow-dung. This serves to keep them moist and protect them from the air. The plaster will fall off itself in due time, when the young trees have become established. *

It is desirable to make packages as small and light as possible for railway transit. For inland distribution the prevailing practice in South India at least, is to use only light bamboo baskets to convey plants. But plants so conveyed should be grown in small pots for at least some months previously. They, when turned out of the latter, the balls of soil are full of roots and compact so that they only require to be tied up with a little grass. When the basket is full of plants thus prepared—close packing being itself a desideratum—a light frame-work of supple cane is attached to support a cloth of leaf covering to protect the plants from the sun. A package of this sort containing three dozen small plants would not usually weigh more than 50 lbs., which is a cooly load. It needs no watering for 10 days and will travel safely from Cape Comorin to the Himalayas. In the case of hardy plants the balls of soil can be considerably reduced.

Small plants and cuttings are safely conveyed by post, even to Europe. This is best done by placing them in a hollow plantain stem of which sections of any length conformable to the Postal Regulations may be used. It is only necessary to use the inner cylinder of the stem, which may be securely covered by wax-cloth or even strong brown paper. All kinds of bulbs and tubers are, of course, easily conveyed through the medium of the Post Office.

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* "Le Jardinier de tout le Monde," p. 264.

CALENDAR OF OPERATIONS FOR THE PLAINS OF NORTHERN AND CENTRAL INDIA.

JANUARY.

VEGETABLES

FROM this month forward vegetables of every kind will need to be constantly watered, and if once or twice a week with liquid manure, all the better.

Water Squashes every day, copiously.

Make sowings Radishes, Mustard, Crees, Spinach, and Lettuce for a succession. In the Upper Provinces Peas may also be sown during this month ; but not in Bengal. Sowings of Celery may now be made for young plants to preserve through till the following cold season, if thought worth the while.

Put out young plants of Cabbage and Knol-Kohl to fill up vacant places in beds. Put out young Celery plants for succession.

Celery will now be in a condition fit for earthing up to blanch.

Keep a few plants of Lettuce, Mustard, and Cress for seed. Reserve one or two of the earliest formed heads of Artichoke for seed in Bengal : it is not necessary to do so in Upper India.

The plants should now be taken up for manufacture of Tapioca and Arrowroot.

FRUITS.

Strawberries will now be blossoming and fruiting, and will require to be well watered : and nets or other means provided to protect them from birds.

Water Loquats copiously.

Peaches and Plums should now be pruned.

ORNAMENTAL PLANTS.

Commence giving surface-dressings of fresh cow-manure to Roses.

Chrysanthemums will have done flowering and should be taken out of their pots, pulled to pieces, and put out in a nursery-bed for a supply of new plants.

The following plants will be much benefited by being well pruned in at this season:—

Allamandas.
Bignonias.
Hamelias.
Hibiscus mutabilis.
——rosa—sinensis.
——Syriacus.
Ixoras.
Jasminums.
Jatropha panduræ folia.
Lagerstrœmias.
Lantanas.
Meyenias.
Malvaviscus arboreus.
Mussændas.
Nyctanthes.
Quisqualis.
Tecomas.
Brunfelsias.

FEBRUARY.

VEGETABLES.

LITTLE can be done during this month in the cultivation of European vegetables, except copiously watering those that are already in the ground.

Sowings of Lettuce, Mustard, and Cress may still be made.

To Peas that are reserved for seed, less and less water, if any, should be given as they ripen.

FRUITS.

Water Loquats liberally, as well as Peach, Plum, Lichee, and Mango trees, as soon as the fruit is set.

Earth up and water Pine-Apples.

Fertilise Vanilla flowers.

Sow seed of Water-Melon.

ORNAMENTAL PLANTS

This is the best season for transferring such Orchids as required to new pots or baskets.

Hoyas will be started into growth, and should either have the soil in the old pots partially changed, or be potted afresh; they will now bear dividing so as to make several plants out of one.

Re-pot or re-plant Caladiums, Arum pictum, Manettia cordifolia, Cyrtopera flava, Hibiscus Jerroldianus, Gloriosa superba and all such-like plants, that have been lying dormant during the cold season, as well as the several species of Crinum, Globba, Pancratium, Alpinia, Hedychium, Hippeastrum, and Kæmpferia.

Put in the border Petunias, Phloxes, Salpiglossis.

Sow seeds of Poinciana, Tecoma, etc.

Pot off the choice kinds of Roses raised from cuttings laid down in November, and keep them in the shade, well watered.

Roses now may be layered with success.

MARCH.

VEGETABLES.

ABOUT the middle of this month remove the soil from the stools of Asparagus and cover them over again immediately with fresh soil ; well enriched with old manure, and commence watering copiously.

Take up Carrots and Beet, and store them in pots of dry earth for future use.

Take up and store Onions.

At the beginning of this month, in the Upper Provinces, seeds of American Squash should be sown.

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The stumps of Cabbages that have been cut should be allowed to remain and be watered, as by their sprouts they will afford nice gatherings for the table for some time to come.

Dry the leaves of English Sage and Thyme, and store in bottles.

Make sowings of Parsley in a shady place.

FRUITS.

Lichees will be ripening; cover the trees betimes with nets, to save the fruit from birds.

Well water Peach, Plum, and Mango trees, Fertilise Vanilla flowers.

Cut back closely all wood, of last year's growth, of Bâel trees.

This is the season, both in Bengal and Upper India, for sowing the seeds of fine kinds of Melons.

Thin out Plantains, remove the soil from the roots, fill in with fresh cow-manure, and water liberally.

ORNAMENTAL PLANTS

Withhold water from Dahlias, and when the stems have died down, take up the tubers and store them in pots of earth or sand in a dry godown.

Treat in the same way the several species of Oxalis.

Withold water from Gloxinia maculata, Lilium longifolium, and Richardia Ethiopica, and when the stems and leaves have died down, remove the pots, with the bulbs within them undisturbed, to some dry godown, till the time of re-potting in the following October. Other bulbous and tuberous-rooted plants of a similar description should, of course,. receive similar treatment.

Cut well back the wood of last season's growth of shrubs, such as Poinsettia, Holmskioldia, Hamiltonia, Phlogacanthus, Aphelandra, Buddlea, Thunbergia and Cassia alata, that have lately finished flowering.

Euphorbia Jacquiniflora should be treated in a similar way, and the cuttings inserted in pots of sand kept in a sheltered place and well watered; they will afford a nice stock of new plants.

Take up the choicer kinds of Verbena to pot, and keep under shelter during the rains.

APRIL.

VEGETABLES.

LITTLE can be done now in the cultivation of vegetables.

Well water Asparagus.

Gather seed of Onion and Salsify.

Put Yams in the ground, and construct trellis-work for them to trail upon.

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FRUITS.

Water Melons unremittingly.

Keep Strawberry-plants watered while the hot season lasts.

ORNAMENTAL PLANTS

The leaves of Gladiolus and some other bulbous plants will be dying down. The pots containing them should be removed to some dry place, where they may remain till the time for re-potting comes round again.

Achimenes, which at this time will be starting into growth, should be potted and well watered as soon as they appear above ground.

MAY.

VEGETABLES.

ASPARAGUS will now be in season, and the beds must be kept most plentifully watered.

Lettuce may be raised in a shady place from acclimated seed. Beyond this there is nothing that can be done as regards European vegetables.

At the close of the month is the proper time for sowing most native vegetables; the several kinds of country Beans, Cucumbers, and Gourds; of Maize, Ochro, Brinjals, etc.

This is the period likewise for planting Ginger,- Arrowroot, Jerusalem Artichoke, Kuchoo or Ghoyan, Sweet Potatoes, and the Tapioca plant.

FRUITS.

Continue to water Pine-Apples.

This is the proper season for inarching and making gootees or layers of all the different kinds of fruit trees.

ORNAMENTAL PLANTS

There is little to be done in this department besides watering abundantly young and choice plants.

JUNE.

VEGETABLES.

MAIZE and the ordinary country vegetables may still be sown. There is nothing that can be done as regards European vegetables.

FRUITS.

Seeds of Mango should now be sown for a supply of stocks for inarching upon.

The operations of gootee, layering and inarching may still be carried on, and cuttings laid down to strike.

ORNAMENTAL PLANTS

The slips of Chrysanthemum laid down in January will now have become large plants. They should be taken up from the nursery-bed and pulled apart, and each rooted slip be potted in a single pot, and those of the choicer kinds put under shelter before the heavy rains set in.

For potted plants, which are to be left exposed to the weather during the rains, bricks should be laid whereon the pots may rest, out of access from worms.

At the end of this month cuttings of most tropical plants may be put down for striking.

As soon as the rains have set in, examination should be made to ascertain where plants are liable to suffer from the lodgment of water around them, and the speediest means that can be devised taken for draining it off.

JULY.

VEGETABLES.

DURING this month sowings of most native vegetables, such as Brinjals, Ochro, Pulwuls, Cucumbers, the different kinds of runner Beans and Gourds may be continued.

Arrowroot, Ginger, Turmeric, and Jerusalem Artichokes about this time will require earthing up.

FRUITS.

The crowns of Pine-Apples of a fine kind, when wrenched off, should not be thrown away, but inserted in pots of sand under shelter. If watered regularly, they will soon form beautiful healthy plants.

This is the best time for budding Peaches, Plums, and trees of the Orange and Lemon tribe in Bengal (Lower).

Sow Indian Sorrel and Cape Gooseberry.

ORNAMENTAL PLANTS

At this season sow seeds of—

Amaranthus.
Balsam.
Colonyction.
Carthamus.
Cockscomb.
Dahlia.
Datura.
Dianthus.
Ipomœa rubro-cærulea.
Martynia diandra.
Nicandra physaloides.
Nicotiana.
Pentapetes phœnicea.
Quamoclit.
Sesamum.
Phlox Drummondii
Sun flowers.
Zinnia.

On examining Dahlia tubers that have been stored away in pots of earth or sand, it will very likely be found that they have begun to make shoots ; if so, they should be potted immediately.

Gloxinia maculata will now require to be re-potted.

The budding of Roses in Lower Bengal might now be attempted.

This is the most successful season for striking cuttings of all soft and hard-wooded tropical plants which can be propagated in that way, such as Coleus, Hibiscus, etc.

Cuttings also of Rose Edouard, Devoniensis, and the China Roses will strike at this period.

AUGUST.

VEGETABLES.

SOWINGS of Celery should now be made in pots, under shelter from the rains. The seed will be slow in germinating; but it is important that plants should be brought as forward as possible for planting out when the rains are over in October.

At this time also Asperagus-seed should be sown, for a supply of plants to make new beds within October if needed.

Sow the small kind of Tomato.

FRUITS.

It will be found that Peaches, Plums, and the Orange and Lemon tribe may now be budded successfully in Lower Bengal.

Cuttings also of the Orange tribe, now laid down, will strike readily.

The fruits of Guavas, Custard-Apples, and Pomegranates should be tied up in fine muslin, to protect them from the attacks of birds and vermin.

Now is the season for planting out suckers or offsets of Pine-Apples.

ORNAMENTAL PLANTS

Roses may be budded during this month also in Lower Bengal.

Stephanotis floribunda and many of the choicest tropical plants may now be propagated by cuttings in sand under glass.

SEPTEMBER.

VEGETABLES.

MAKE sowings of Patna Pea.

Commence sowings of Cauliflower, Cabbage, Knol-Kohl, and Artichoke in pots under shelter, or on a raised piece of ground under a hoogla, in order to have plants well forward for putting out in the open ground as soon as the rains are over.

FRUITS.

Peach-Stones sown now will come up in February, and afford stocks for budding upon in August.

Prune away the lowermost leaves of Coconut trees.

ORNAMENTAL PLANTS

Sowings of Aster, Heartease, and Cineraria should be made this month, as these plants take a long time to mature for blossoming favourably.

At the beginning of this month sow Balsams in Lower Bengal.

Richardia Ethiopica and the several species of Oxalis will now be moving. They should be potted and brought to the light immediately they appear above ground.

OCTOBER.

VEGETABLES.

As soon as the rains are well over, no time should be lost in preparing the ground and making sowings of Turnips, Carrots, Peas, Beans, French Beans, Lettuce, Tomato, Spinach, Endive, Salsify, Mustard, Cress, Radishes, Beet, Onions, and Leeks.

Sow in Bengal English Cucumber-seed and American Squash.

Put out in their places in the open ground young plants of Cauliflower, Cabbage, Knol-Kohl, Artichoke, and Asparagus.

FRUITS.

Now is the season for making up Strawberry-beds and putting in the plants.

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In the Upper Provinces gather Putwa before it is injured by the cold.

Sow seeds of—

Almonds.
Avocade Pear.
Bencoolen Nut.
Cowa-Mangosteen.
Custard-Apple.
Guava.
Hog-Plum.
Khirnee.
Lichee.
Peaches.
Plums.
Pumelo.
Strawberry.
Tree Tomato.
Wampee.

ORNAMENTAL PLANTS

About the middle of this month is the time for making sowings of all the English Annuals, either in pots or on a raised border under a hoogla.

Pots containing bulbs of Lilium longifolium should be well soaked with water ; and about twelve hours afterwards, the soil being thus rendered perfectly loose, the bulbs should be carefully taken out and re-potted.

This is the best month to commence the general pruning of Roses in Upper India.

This is the best time for imported bulbs to arrive for potting, such as Hyacinths, Anemone, Ranunculus and the several kinds of Narcissus, Iris, Ixia, etc.

Re-pot—

Aloysia citriodora.
Antirrhinums.
Carnations.
Centradenia.
Columbine.
Pansies.
Franciscea.
Geraniums.
Geum.
Habrothamnus.
Heliotrope.
Hydrangea.
Iris.
Linum.
Lophospermum.
Pinks.
Plumbago rosea.
Scabious.
Sweetwilliam.
Verbenas.
Violet.

In Upper India repair the paths.

NOVEMBER.

VEGETABLES.

MAKE successive sowings of Peas, French Beans, Turnips, Carrots, Radish, Lettuce, Beet, Mustard, and Cress.

Thin out betimes Turnips, Carrots, and Beet.

Make successive plantings of Cauliflowers, Cabbages, Knol-Kohl, Lettuce, and Celery.

Stick Peas before they begin to fall about.

Earth up Potatoes.

Yams are now fit to be taken up for use.

Plant out Onion-Bulbs for obtaining a crop of seed from in April.

Take up Mint and plant it in a fresh soil, well enriched.

ORNAMENTAL PLANTS

This is the best season for putting down cuttings of all kinds of Roses, and indeed of most exotics—natives of colder climates.

The several species of Canna may now be dug up, parted, and planted in fresh ground.

DECEMBER.

VEGETABLES.

MAKE sowings of Radish, Mustard, Cress, Lettuce, Peas, and French Beans for succession.

Put out fresh plants of Knol-Kohl, Cabbage, Cauliflower and Celery.

The most advanced crops of Celery will be now in a condition for earthing up to blanch previous to use.

Water well Celery, Squash, Radish, and Asparagus seedlings.

Withhold water from old Asparagus plants, that they may die down and go to rest.

FRUITS.

Gather Roselle.

Well water Caps Gooseberries. In the United Provinces the plants should be covered in at night during the cold months, or they will be much injured by the cold, and the fruit will not ripen.

Place seedling Bilimbis in a warm, sheltered place during the cold months.

Towards the close of the month cover again the roots of fruit-trees, that had been exposed, with fresh, well-enriched soil.

ORNAMENTAL PLANTS.

Put down cuttings of Aloysia citriodora, Heliotrope, Geranium Pinks, Carnations, Habrothammus, Verbenas.

Allow to dry down Arum Pictum, Gesnera tubiflora, Sprekelia, the varieties of Caladium, and such like potted bulbous plants.

In the United Provinces cover at night, to protect from frost, young Heliotropes, Tropœlum, Canay creeper, and seedling Menhdee plants.

Keep under the shelter of a warm verandah Ixora Javanica, Hoyas, and Vanilla plants that are in pots.

Make successive sowings of such quick-growing things as Browallia, Linaria, Cuphea, Mignonette, French Marigold, and Convolvulus Major.

Asters, Cinerarias, and Pansies will require re-potting in a richer soil.

CALENDAR OF OPERATIONS FOR THE HILLS OF NORTHERN INDIA.

JANUARY.

VEGETABLES.

THERE is little that can be done in this month. As a rule the ground is covered with snow, and very few of the ordinary vegetables survive the effects of the "white mantle." The work, therefroe, in the vegetable garden is at a standstill.

FRUITS.

The same may be said of the fruit-garden. It is not known if fruits are grown under glass on any of the Hill-stations ; but even if they were, all that can be done is to maintain an equable temperature in the house, ranging between 50° and 60° Fahr.

FLOWERS.

In the flower garden out of doors, the ground being covered with snow, it is impossible to do anything. It is assumed that such plants as need the protection of the stove or green-house have been sheltered therein. Others that are left out of doors, such as Roses, etc., should be looked at occasionally to see that they are properly sheltered. Care must be taken not to allow the temperature in the stove to go below 50° Fahr at night. About this time a careful search should be made for insect-pests, which should be destroyed, or they will begin their depredations on the first approach of Spring.

FEBRUARY.

VEGETABLES.

DURING this month the heaviest falls of snow occur generally ; but this should not deter the careful gardener from making preparations for the sowing of early vegetables in pots, pans, boxes, and glazed frames having bottom-heat. By bottom-heat is meant a hot bed, into which the pots and pans must be plunged up to the rim. Seeds of Carrots, Turnips, Lettuce, Cabbage, Cauliflower, Spinach, Endive, Asparagus, Radish, and Cress should be sown. If there are no frames, then the pots, pans, and boxes must be kept in the green-house or stove.

FRUITS.

About the end of this month, the fruit-trees will begin to show signs of reviving life. The roots should be cleared of all rubbish, and preparations made to open the soil round them. This should not, however, be done unless there is a prospect of the snowfall ceasing.

If the season promises to be an early one, Apple, Pear, Apricot, and Plum trees should be pruned about the end of this month and manured. Strawberry-beds should now be prepared and the suckers transplanted.

FLOWERS.

In the flower-garden the busy time will begin about the end of this month. Sowings of English Annuals should now be made in pots and pans, especially Calceolaria, Cineraria, Heartsease, Aster, and Larkspur, as these take longer to develop than others. If it has ceased snowing, Roses, Geraniums, and Fuchsias should be pruned, and the cuttings put down in sand in the propagating frame. This is the best time to re-pot Geraniums, and Fuchsias, and Roses in pots. The beds and borders out of doors should now be looked to, and cleared of all rubbish, and the soil dug up and got ready for planting.

MARCH.

VEGETABLES.

THIS is a very busy month for the gardener on the hills. The vegetables sown last month should be put out in the open about the middle of this month. Make successive sowings of the same, and first sowings of Peas, Beans, Tomato, Salsify, Mustard, Beet, Onion, Cucumber, and Knol-Kohl, either in prepared sheltered beds, or in pots, pans, and boxes.

FRUITS.

Fruit-trees should now be pruned and manured. The treatment for each will be found in its proper place. It may be mentioned in a general way that whatever treatment fruit-trees receive now, will show itself in the fruit hereafter.

FLOWERS.

About this time the stove and green-house should be thoroughly overhauled. Cuttings of Geraniums, Fuchsias, Roses, Hydrangeas, Begonias, etc., should be put down, and a good stock of plants will be the result. Bulbs of Hyacinths, Narcissus, Gladiolus, Tulips, Ranunculus, Anemones, Spiræas, Ixias, Sparaxis, and the different varieties of Lilium, should be put down in pots, or in well-prepared borders.

An occasional application of liquid manure now will have a wonderful effect on Roses. Geraniums and Fuchsias will also be greatly benefited by an occasional supply.

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Seedlings of annuals will be requiring their second shift about the end of this month. Cinerarias, Calceolarias, and Heartsease will be sufficiently developed to be moved into their permanent quarters. They should have plenty of light (sun-light) and air. The best place for them is under a cloth awning. They should be liberally watered, and, once a week, with a weak solution of liquid manure. These annuals made a grand show if well cared for now.

Ferns should be carefully examined, and those requiring it, should be re-potted. Many of the soft-wooded plants under glass will also require re-potting at this season.

Perennial Phlox, Carnations, Picotees, and Hydrangeas should now be looked to. Give them fresh soil, remove all old and dead branches, and put down cuttings.

The nights and mornings are yet very cold, and care should be taken not to allow the temperature in the stove and green-house to go down too low.

APRIL.

VEGETABLES.

THIS is also a busy month. Successive sowings should be made of the vegetables sown last month. Water the transplanted seedlings copiously.

FRUITS.

Strawberries will now be ripening, and should be watered copiously or the fruit will be small, and wanting in taste. Water other fruit-trees also sufficiently.

FLOWERS.

Roses, Geraniums, and Fuchsias will now be making rapid growth, and should be kept well supplied with water. An occasional application of liquid manure will have a good effect, especially on Roses in pots and tubs. Dahlia bulbs should now be looked to. They should be carefully turned out of their old pots, and planted in fresh, rich soil—the richer the better, tubers of Caladiums, Alocasias, Gesneras, and Gloxinias, should now be planted in pots together with tuberous rooted Begonias. Cuttings of Roses, Geraniums, Fuchsias, Begonias, etc., if put down now will strike very readily.

MAY.

VEGETABLES.

THERE is nothing particular to be done in this month in the way of vegetables, except to make successive sowings, and water copiously all such as have been transplanted. This is generally a very dry

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month, and unless water is abundant, there is a chance of the vegetables, especially roots, not swelling and fully developing. Sowings of American Maize may now be made.

FRUITS.

Apples, Pears, Apricots, and Cherries will now be developing. Measures should be taken to protect the fruits from the depredations of birds and flying squirrels. If water in sufficient quantity is available, it should be well supplied.

FLOWERS.

The syringe should be frequently used in the stove and greenhouse now. Most of the annuals will now be coming into flower. Cinerarias, Pansies, Calceolarias, and Mimulus will require frequent waterings. So will Roses, Geraniums, and Fuchsias. Hyderangeas will now be looking up, and any attention now given them, in the way of liquid manure, and loosening the soil round the roots, will produce good effects. They will make a grand show next month.

JUNE.

VEGETABLES.

SUCCESSION sowings may now also be made. Most of the vegetables will now be ready for use. Celery should be earthed up now for bleaching.

FRUITS.

There is not much to be done this month, except to water the trees freely. This is the best month for grafting.

FLOWERS.

Roses will now be in full bloom, as well as Fuchsias, Geraniums, Hydrangeas, and most of the annuals. They should be well supplied with water. Begonias will now be in full display. Cuttings of most of the flowering perennials put down now will make good plants. The syringe should be freely used, both for in and out-door plants. Ferns will require to be kept moist this month.

JULY.

VEGETABLES.

THE rains will have set in now, and any seeds sown during this and the two following months, must be kept under shelter to protect them from the heavy rain. Succession sowings of most vegetables may be made.

FRUITS.

Apples, Pears, and Apricots will now be ripening and should be protected against depredations of all sorts. At the end of this month, sow seeds of the hill Apricots for a stock of plants to graft some of the superior English varieties upon.

FLOWERS.

Dahlias will now be flowering, and occasional applications of liquid manure will have a very good effect upon them and Hydrangeas. Hanging baskets filled now with wild ferns, and other cultivated varieties of Adiantums, Davallias, Nephrolepis Duffi, etc., with a Begonia in the centre, will have a very fine effect in the stove and green-house. Fuchsias will now be making rapid growth. The cuttings put down in April and May will now be well-established plants, and should be potted off in three and four-inch pots in good rich soil, and plenty of drainage. Cuttings of Begonias, Dieffenbachias, Anthuriums, Dracænas, Crotons, etc., should now be put down, together with Geraniums, Fuchsias, and Hydrangeas. The stove and green-house must be examined every day for insect-pests. The tempreature within should be kept as equable as possible.

AUGUST.

VEGETABLES.

DURING this month there is generally either very heavy rain, or a long break, and there is not much to be done in the way of sowings out of doors. The msot important operation now is to see that the heavy rain does not wash away any young seedlings put out last month.

FRUITS.

Apples, Pears, and Apricots will now be fit to pluck. The trees generally become very much exhausted, and the sooner the fruit is removed, the better for the trees. Grafting may be done in this month, as well as budding of Peaches.

FLOWERS.

Cuttings of Begonias, Geraniums, Fuchsias, etc., may still be put down in sand in the hot-house. Hydrangea cuttings put down now will form fine plants by the end of March. Fuchsias make a great deal of growth this month, and should be kept properly staked. Dahlias will also require staking. A strict supervision should be kept over the frames and houses, as it is at this time that a lot of mischief is done by plant-pests. Roses may be budded during this month, and cuttings of China, Tea and Bourbon varieties put down in glazed frames.

SEPTEMBER.

VEGETABLES.

ABOUT the beginning of this month seeds of Carrots, Cabbage, and Cauliflower may be sown under shelter for the late autumn supply; other seeds might also be sown if there is room available for them. About this time suitable plants should be selected for seed.

FRUITS.

Some of the later varieties of Apples, Pears, and Plums ripen in this month, and will require to be protected from the depredations of birds. After the fruit is removed, all dead and decayed wood should be cut away; the old wood, and such as has done bearing, should be cut back, and the trees trimmed to the shape it is intended they should take. As a rule this work is sadly neglected in hill gardens, and the result is trees of straggling growth, overcrowded with unnecessary wood, to the great detriment of the fruit-bearing wood, which gets no chance to develop. Seeds of Apples, Apricots, and Pears may be sown now, if it is desired to raise seedlings.

FLOWERS.

Dahlias will now be finishing their blooming, and steps should be taken to put down tallies in the spot where the roots are intended to remain for the winter, so as to identify them next year. Withered flower-heads should be removed, unless it is intended to gather seed. The better plan is to take up all the tubers after the plants have finished their growth, and to store them away in dry sand or saw-dust. Most of the annuals will now have finished their flowering season, and arrangements should be made to gather seed. Perennial Phloxes should be put under shelter at the end of the month. Cuttings of Geraniums, Picotees, and Carnations, can now be put down with much advantage.

OCTOBER.

VEGETABLES.

CELERY beds should be supplied with fresh manure now. Artichoke-seeds may now be gathered, and the plants cut back, the roots being supplied with fresh soil. Sowings for the winter supply should now be made in frames, of Lettuce, Cress, Radish, etc.

FRUITS.

All fruit-trees will now be entering that stage in which they will require rest. Water should be withheld, except occasionally.

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Opportunity should now be taken, at the end of this month, of giving them a general pruning. This operation is very much neglected on the hills. Those trees that have not fruited during the season, should now be root-pruned.

FLOWERS.

Most plants will now be entering the rest stage, and water should be sparingly given to such plants as Ferns, Gloxinias, Gesneras, Dieffenbachias, etc., which should be allowed to die down gradually. Tuberous-rooted plants generally should get no water, and as soon as the soil is quite dry, and the stems have died down, the tubers should be taken up and carefuly stored away in dry sand or saw-dust. The temperature in the stove must be increased, especially at night. Seeds of annuals should be gathered, and the beds and borders cleared of the dead plants, which might be done by digging them into the soil.

NOVEMBER.

VEGETABLES.

DURING this month there is not much to be done in the way of sowing. Seedlings of last month's sowing should be put out under shelter. This is the best month for gathering seeds of most vegetables which have finished their growth.

FRUITS.

There is nothing to be done this month out of doors. It is not usual to cultivate fruit-trees under glass on the hills yet. Young plants might be protected from the frost, which begins this month.

FLOWERS.

The principal operation this month is to protect such of the out-door plants as need protection from the cold. Sometimes it snows during this month, with heavy rain and sleet. In the houses the temperature must be raised and steadily maintained during the night, or the result will be fatal to many rare, beautiful and tender plants. Ferns and Orchids in particular will suffer severely if the temperature is allowed to go down below 60°F. All plants will need less water, many none at all; but in this the gardener must be guided by experience and local requirements.

DECEMBER.

VEGETABLES.

THERE is scarcely anything to be done this month, and the remarks for last month will apply equally for this one. If it is thought worth while, some of the later seedlings from October might be kept in frames with a hot-bed ; but, as a rule, English vegetables are in full season on the plains during this and the next two months, and residents on the hills obtain their supplies from this source during the winter.

FRUITS.

There is nothing to be done during this month out of doors. Most of the fruit-trees will have shed their leaves, and will soon be putting on their winter mantle of snow.

FLOWERS.

The remarks for last month will apply equally for this. Water should be entirely withheld from all plants except those that flower during the winter, and these should be sparingly supplied—just enough to keep them alive.

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PART II.

THE VEGETABLE GARDEN

PART II.

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VEGETABLE GARDEN

CULINARY VEGETABLES.

VEGETABLES are given an important place among human food by modern dietetic scientists. The absence of fresh vegetables results in such diseases as scurvy. Vegetables furnish nourishment in the form of starch and sugar, and also stimulate intestinal activity. In the liverish climate of India vegetables are doubly desirable. The term *vegetables* has, by common consent, come to be applied to a particular class of plants. Of these we eat the leaves, buds, stems, roots, and occasionally the fruits. The question, "Is the Tomato a fruit for a vegetable?" is really not admissible. The Tomato is botanically a fruit, just as a Pear is—but we use the Tomato as we do other members of the vegetable class. Fruits are very sugary to taste, vegetables are not, and a sugary taste is most undesirable in them. Some object to the Sweet Potato on this account.

Vegetables are on the whole short-season plants, but permit of repeated sowings to prolong the season. We may distinguish between Indian and English vegetables. Both, however, will be treated seriatim, and together.

PRELIMINARY.

The treatment of the soil for vegetables must, in India, differ according as the cultivation is to be on a field scale, or merely in a small garden plot. Laborious hand-digging or trenching, permissible and recommendable in a small garden plot, is out of the question when acres are to be sown. *In this book the cultivation of vegetables will be considered from the point of view of the small garden plot only*—a plot assumed not to exceed one acre. It is absolutely essential for the cultivation of even passable vegetables that the top two feet of soil be thoroughly worked up and manured before sowing, and that tilth and aeration be attended to while crops are growing. An operation called *trenching* is undoubtedly the finest way of preparing a vegetable garden. The operation has long been practised in Britain. It requires, however, the use of the spade, an instrument in the use of which the Indian coolie requires special training. Plate XIV shows how it is done.

For the majority of vegetables, beds four feet broad with paths between are suitable. Some crops, like Tomato, are better grown on ridges and irrigated in the furrows. These are mentioned as they occur. Vegetables need more frequent watering than any other class of crops, and once in four days is about right in dry weather.

It is possible to get a greatly increased yield from a vegetable plot by sowing different kinds of vegetables together and taking off the earlier crops soon, leaving the later crops to make their full development in the increased space. Thus, Beets and Radishes may be sown together and the Radishes cleared off before the Beets crowd them too much.

The Beets are put in rows 24 inches apart, and the Radishes in rows between the Beet rows. Again, early Cabbage and Spinach may be sown together. The rows of Cabbage are 36 inches apart and the Spinach rows between these. Rows of Lettuce can be put in additionally. Other combinations will be mentioned under the headings of the various vegetables.

Sowings should be done in a seed-bed and the seedlings transplanted to their position. Transplanting is carelessly done by the Mâlee. It ought to be done most carefully. Plate XV shows the wrong and right ways of transplanting.

The ground between vegetables must be kept continuously hoed and never allowed to crack. Weeds must be eliminated.

Combined with this a method of rotation of crops is necessary. By rotation the ground gets a rest from one type of plant and bears another making different demands on it. The simplest way is to divide the garden into four equal plots. Plot 1 contains Pulses, and surface crops like Celery and Leek. Plot 2 contains root-crops like Carrot and Beetroot. Plot 3 contains greens like Cabbage, Cauliflower, etc. Plot 4 contains Potatoes. Next year Plot 1 is treated as if it were Plot 4, Plot 2 like 1, Plot 3 like 2, and Plot 4 like 1, and the rotation continued and completed in four years.

FUNGI.

AGARICUS CAMPESTRIS

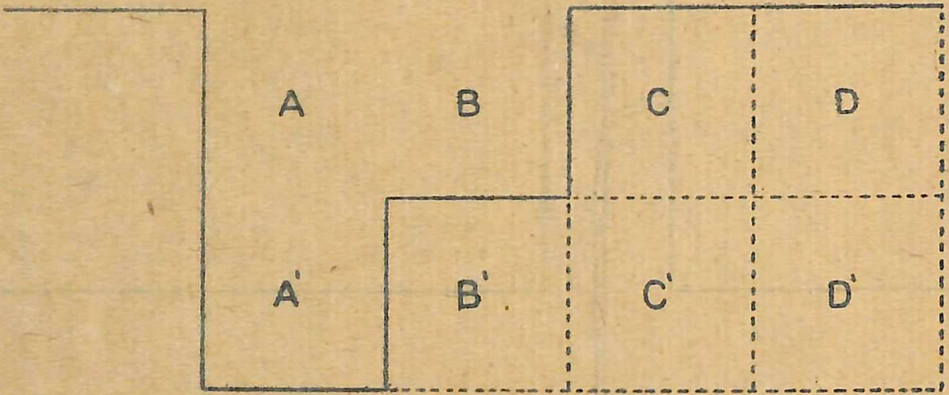
MUSHROOM.

MUSHROOMS are produced spontaneously and in great abundance in many parts of India and may be had merely for the trouble of gathering, but the edible ones are so exceedingly difficult to distinguish from others that are poisonous, that it would be better, unless absolutely certain of the right ones, to abstain from them altogether.

The characters of an edible mushroom are these:—

(1) It grows on grassy places or on rubbish heaps.
(2) It is of small size (two to four inches across the cap).
(3) The gills are free from the stem and at first pink in colour.
(4) The spores are deep purple or brown.
(5) The stalk is solid and has a fixed ring.

Fig. 29.



TRENCHING.

Soil from A, A^1, and B is dug out and kept on one side. Bottom of A^1 is forked B^1 soil is moved by spade to A^1, and C soil to A position. Bottom of B^1 then forked. C^1 moved to B^1, and D to B. To finish, bottom of C^1 is forked, A^1 and A soil transferred to C^1 and C, and B to D.

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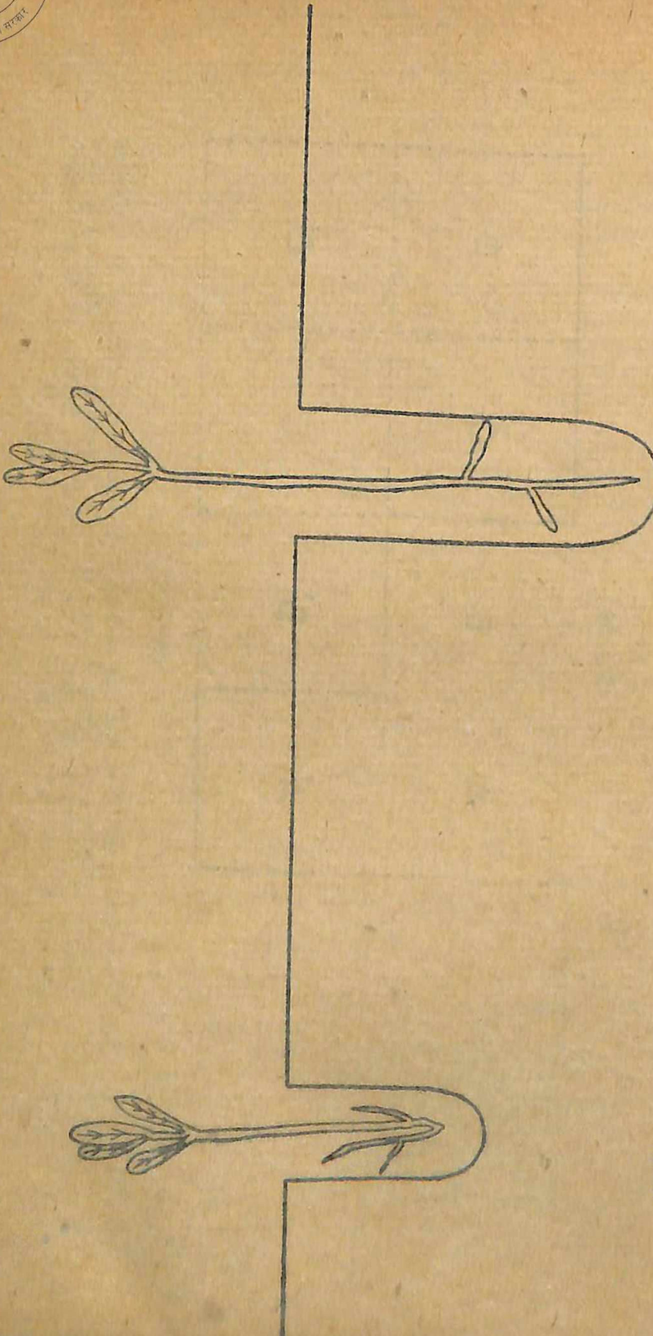
Fig. 30.



Transplanting.

These characters must be taken together, and unless a species of mushroom has all of them, it is probably not the ordinary edible mushroom. The following are the mushrooms *to avoid*:

(1) Every mushroom having a cap or suggestion of a cap at the base of the stalk.

(2) Those having an unpleasant odour, a bitter or unpalatable flavour, or a tough consistency.

(3) Those having milky juice.

(4) Those that are very brittle and those whose gills are nearly all of equal length, when the flesh of the cap is thin, and especially when the cap itself is of a bright colour.

(5) Those that are deep-seated in the soil.

(6) Those infected with worms or which have begun to decay.

The cultivation of mushrooms has not been tried in India. In Europe it is done by making a bed of horsedung, sowing mushroom "spawn" on it and covering with sifted soil and litter. Shelter by a shed is desirable when the mushrooms begin to show; the bed is syringed with tepid water frequently and the crop gathered as it matures.

MORCHELLA ESCULENTA.

MOREL.

Khumb.

An edible fungus, well known in Europe, and produced in the greatest abundance in Kashmir. Dr. Henderson states that at Shahpur and most other districts, where there is Kuller in the soil, it is very plentiful in August and September after the rains. Mr. Pannell says also that it is to be found in Lahore in considerable quantities.*

Mr. Berkely states that it is grown much in Germany, and that it is particularly partial to a burnt soil. The Morel is only suited to the cold parts of India.

TUBER ÆSTIVUM.

ENGLISH TRUFFLE.

Until the successful attempt made by M. Auguste Rousseau, of Carpentras, some years ago, the Truffle had not been made subject to the control of the gardener. In this country it is not likely that it will ever be had but by seeking it in those spots where it is produced spontaneously. There are several edible species, but it has not been

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*Proceedings of the Agri-Hort. Soc. of the Punjab, Dec. 1865, p 11.

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till lately that any have been known to be natives of India. Colonel Elphinston pronounces a certain fungus found in the Kangra Valley to be a true Truffle ; and describes it as a round rootless tuber with a thick skin, which, when peeled and cut, displays the anastómosing veins and granular formation of the true Truffle. It grows a few inches under the soil, some of the larger ones making their appearance above the surface. It is of an earthy yellow colour, not unlike a potato in appearance. The Kangra Truffle is found only where the *Pinus longifolia* grows, and there in great abundance. Colonel Elphinston adds, that when cooked it proved highly flavoured and of excellent quality.* Unknown in the South of India.

GRAMINACEÆ.

ZEA MAYS.

MAIZE—INDIAN CORN.

Bhoota—Mukka—Mukka Cholum.

The unripe and tender heads of Indian Corn, when cooked, are considered by most persons a most delicious vegetable. They are first boiled in milk, afterwards roasted, and then eaten with butter, pepper and salt.

The plants is a native of Mexico; but has now become thoroughly naturalised in all parts of India.

The usual season for sowing the seed is about the beginning of the rains, even on the hills. It should be sown in rows two feet apart, and the grains at six inches apart, thinned out later to eighteen inches. When the plants are fifteen inches high, earth them up to four inches, and when the plants are thirty inches high, earth up to one foot. The heads will be fit for use in August and September. Indian Corn degenerates somewhat rapidly in this country, being subject to frequent cross-fertilisation. It is expedient, therefore, that seed of the best kinds should occasionally be imported from America. Maize may be sown mixed with melons and cucumbers or with beans.

ARACEÆ (AROIDEÆ).

COLOCASIA ANTIQUORUM.

Kuchoo—Ghoyân—Kesavedantu.

A native vegetable, of which the tubers, nearly resembling in outward appearance those of the Jerusalem Artichoke, are the part eaten. The mode of cooking them is to pare them and fry them in

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*Proceedings of the Agri-Hort. Soc. of the Punjab, Dec. 1865, p. 7.

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ghi. They are not in great request with Europeans. The tubers are rather acrid, but there is a non-acrid variety occuring rarely in Malabar. In flavour they are not very unlike Salsify.

They are cultivated much in the same way as Jerusalem Artichokes. The smaller of the tubers, being saved for the purpose, are planted about the end of May. The ground should be first well dug and broken up, to render it loose, and then furrows drawn across it, fourteen inches apart and four or five inches deep ; in these the tubers should be laid at fourteen inches apart, and the soil then covered in. They will require irrigation about every four days. This sub-aquatic herb representing the English "cuckoo pint" is commonly found by the side of canals, and in marshy land. It is also commonly cultivated on waste water from taps. It requires rich garden land or sandy loam and can take a great deal of manure. The seed rate is 600 lbs. corns per acre and the yield 8,000 to 10,000 lbs. per acre. Young leaves are occasionally eates, and the tubers are considered by the people of the country to be highly nutritious. There are at least two varieties, one with dark purple leaves and stalks and another in which these are green.

Not cultivated on the hills.

LILIACEÆ.

ALLIUM CEPA

ONION.

Peeyaj—I'rulli.

There are many varieties of Onion grown in Europe. some of which, such as the Spanish, are of great size. Local races have been developed in India and seed from these gives fair results. Two of these are the Silver-skin or Patna Onion and the Common or Large Red Onion. Three years' trial of Oporto seed in the Ganeshkhind Botanical Gardens gave the following results:—

(1) The Onions deteriorated and did not return the size of the parent bulbs.
(2) The bulbs tended to "bolt".
(3) Seed arrives at the wrong time of year (December, and the plants suffer in the hot weather.

The seeds of the Onion keep goot but a short time—generally, it is said, not longer than a year ; and as much of the seed that comes to this country is more than a year old, it is not altogether surprising that, when sown, it is so often found to fail of germinating.

The surest way, therefore, of securing good seed is at the commencement of the cold season to purchase several of the finest Onions procurable from the bazar, and plant them out in the garden, about

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a foot apart. These will grow up, and by the commencement of the hot season produce an abundant supply of seed, which should be stored away in well-corked dry bottles for sowing the next cold season.

The time for sowing seed is about the middle of October on the plains, and March on the hills. The sowing may be made broadcast or in drills ten inches apart. The soil should be light, and enriched with old manure, carefully levelled, and in a damp state when the seeds are sown. When the young plants are somewhat advanced in growth, they should be thinned out to about six inches apart.

If imported seed is used, perhaps the preferable method is to sow it in large seed-pans, and when the young plants are about three or four inches high, to put them out in a bed prepared for them in the open ground. They should not be planted deep in the soil. Onions are much benefited by frequent watering. When, by the commencement of the hot season, the bulbs have attained their full size, the stems should be bent down in order that they may more speedily decay. On the stems becoming withered, the Onions should be taken up and laid out two or three days in the sun, and, when well dried, stored away for use.

In the neighbourhood of Calcutta, there has been little success in the cultivation of Onions for storing ; but in the Upper Provinces, with little trouble, abundant crops can be raised for that purpose. The catalogues of English and Continental nurserymen and seedsmen contain a list of many fine varieties. Red-fleshed Onions are the most pungent. The Bellary Onion is most esteemed for general cultivation in the Madras Presidency and Mysore. Varieties imported from Australia and the United States of America are better adapted to the warmer parts of India than are the English and Spanish varieties.

Market gardeners at Bangalore, and other places in the South, prefer transplanting the seedlings to sowing in drills or broadcast and afterwards thinning out. But while the operation is being done it is necessary to irrigate very freely. Night-soil is perhaps the best of all manures for this vegetable. Scrapings from the dove-cot and poultry-yard are also of great value. Onions require a soil that is well worked and should follow such crops as Potato, Carrot, Celery, and plants of the Cabbage tribe.

ALLIUM PORRUM.

LEEK.

The lower part of the vegetable when well blanched is very delicious, boiled and served with melted butter, retaining scarcely any of its Onion-like flavour, and forming an excellent substitute for Seakale, which it then much resembles. Sowings should be made as soon as the rains are over on the plains, and in March on the hills ;

and as this vegetable is much benefited by being transplanted, the seed is best sown broadcast, and thinly, upon a light rich soil. When the plants are about six or eight inches high, the earth in which they are growing should be thoroughly softened by watering, so that the plants may be taken up without injury to their roots. In a well-manured piece of ground rows of holes should be made with a dibble or pointed stick, at the distance of a foot between each row. The holes in the rows should be six inches apart, and about four inches deep. Insert in each hole a young Leek, and a small quantity of earth after it. When all the young plants are put into the ground, give the hole a good watering. As the plants grow, they will require to be earthed up to blanch them. To thrive well they require a great deal of watering. It is said that the tops of the leaves should be cut off occasionally, and that this will induce the roots to swell. The Leek is much improved by the moderate use of saltpetre in its cultivation.

ALLIUM SATIVUM.

GARLIC,

Lehsoon—Belluli.

This vegetable is very much cultivated in most parts of India and is always obtainable at so cheap a rate from the bazar, that it is hardly worth while, perhaps, to undertake the cultivation of it in the garden.

The root consists of several small, so-called, cloves. For cultivation, these are planted out in October singly, in drills about seven inches apart, and two or three inches deep. The crop is taken up in the commencement of the hot weather, and the cloves, after being first well dried in the sun, stored away for use.

ALLIUM SCHŒNOPRASUM.

CHIVES.

This vegetable may be met with in some few gardens, but for the most part is very little cultivated or known in this country. The thin, awl-shaped, Onion-flavoured leaves are the parts of the plant used in cookery. It is propagated by division of the roots in October.

ALLIUM ASCALONICUM.

SHALLOT.

Gundham.

A vegetable not very common in this country. The small Onion-like bulbs are the part eaten. It is propagated by setting out in October on the plains, and from March to May on the hills, the cloves, or bulbs, about six inches asunder. By the commencement of the hot season, the crop will be fit to be taken up to be stored for future use.

ASPARAGUS OFFICINALIS.

ASPARAGUS.

Soot Moolee.

The flavour of Asparagus in this country is much inferior to what it is in Europe. One great recommendation to it, however, is, that it is in season just when all other European vegetables have gone out.

The seeds should be sown in August, or as soon after as practicable, under shelter from the weather, in seed-pans, in very loose mellow earth, both rich and sandy ; for, if the soil be at all retentive, the roots, which are very delictae, will, at the time of planting out, be sure to be broken, and the plants much checked in consequence. By the time the rains are over, the young seedling plants should be about ten inches high.

The most economical mode of proceeding then is, in a plot of ground selected for the purpose, to dig cylindrical holes a foot wide and two or more feet deep, at a distance of a foot and a half apart. In these, to the depth of about ten inches, throw a compost of equal parts of mould and well-decayed manure, with a small quantity of saltpetre. Put one plant in each, spreading the roots horizontally, in a fan form, and taking great care not to break them in doing so. Well water them, and continue to do so constantly, never allowing the soil to become at all dry. As the plants advance in height, so keep filling in soil well enriched with manure. In three or four months' time the holes will thus become filled up to a level with the surrounding ground. About the end of April, or in the beginning of May, they will bear flowers, the removal of which, before forming seeds, though considered by some a needless trouble, will conduce to strengthen the plants. It is, however, of great importance that no portion of the foliage should be plucked, but rather be encouraged to make as vigorous a growth as possible. When the rains commence, the plants will require no further attention ; they will send up, at that period, several shoots, from which cuttings might be made for table use ; but it is far better to spare them and allow them to grow into branches, and not make any cuttings till the following year. In the cold season the stems will die entirely down, and the plants remain dormant till March, when they will make indications of again sprouting. At this time, therefore, preparations may be made for what is called "forcing" them for the table. The earth should be removed till the roots of the plants are

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reached, and a good, rich dressing of manure supplied ; after this they should be well-watered daily. In about a fortnight's time fine green heads, which may be cut for the table, will begin to show themselves above ground.

Asparagus-beds wear out, it is said, in three or four years' time ; but this depends much on the way in which they are treated. If, at the commencement of the growing-season, they be well enriched with manure, and afterwards constantly well-watered, and the plants not cut too severely for use, they will last unimpaired probably for very many years. Salt is usually recommended as a fine manure for Asparagus ; but one of our best practical gardeners in this country states that he has applied it without perceiving any benefit from it.

The treatment recommended above will apply to the hills, except that the seed must be sown in March. The Asparagus grown at intermediate elevations in the south of India is very poor stuff. At hill stations, such as Ootacamund, it is somewhat better. The extreme north, where there is a distinct winter season, affords the most suitable field for this cultivation.

ASPARAGUS RECEMOSUS.

Belaitee Soot Moolee.

Of the blanched young shoots of this plant, the cultivators at Dacca prepare a very agreeable conserve in the way of preserved Ginger. This with a few allied species, are better known in the south for their medicinal and decorative uses.

DIOSCOREACEÆ.

DIOSCOREA.

YAMS.

Roxburgh describes as many as seven eatable Yams, but not more than three or four can be accounted of any value for the tables ; and where, moreover, Potatoes are plentiful throughout the year there seems little inducement for the cultivation of Yams.

1. *D. GLOBOSA—Choopree Aloo.*—This, Roxburgh states to be "most esteemed of all Yams among the Natives, as well as Europeans." Tubers purchased from the bazar under the name of Choopree Aloo do not seem to merit this distinction. Others appear to be superior.

2. *D. ALATA—Khum Aloo.*—This is accounted second in order of merit.

3. *D. PURPUREA—Ruklo Guråniya Aloo.*—This apparently is the Yam brought by Mr. M'Murray, Gardener to the Agri-Horticul-

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tural Society, from the Mauritius, concerning which he states that it is as much cultivated in the Mauritius, as Potatoes are in England, and that it is most excellent. The tuber is of a dull crimson-red outside, and of a glistening white within.

4. *D. RUBELLA—Guràniya Aloo.*—A common but very excellent Yam, as good as any, perhaps, in cultivation. The tuber is of great size, crimson-red on the outside, and of a glistening white within.

5. *D. ATROPURPUREA—Malacca Yam.*—Known also, it is believed, in Calcutta as the Rangoon Yam, is very similar to the last, and an excellent Yam. A tuber of this was sent to the Agri-Horticultural Society from the garden of Captain H. B. Weston, measuring two feet in length, and weighing as much as eight seers.

6. *D. JAPONICA—Chinese Potato.*—Sent to this country by Mr. Fortune : but possessing no merit above the two last kinds, which it much resembles.

7. *D. FASCICULATA—Soosnel Aloo.*—A very distinct kind of Yam ; the tubers about the size and form and colour of large kidney Potatoes, and, when well cooked, bear a greater resemblance in mealiness and flovour to the Potato than any other Yam.

8. *D. SP.—New Zealand Yam.*—Presented to the Agri-Horticultural Society by Captain Hill of Bankshall, and remarkable for producing great ash-grey ærial tubers upon its stems. From the account Captain Hill gives of it when cooked, it is more to be regarded as a curiosity than for any value it possesses for the table. It was grown in the Barrackpore Park, and found to be exceedingly prolific.

Yams should be put in the ground in April ; the soil having been previously dug deeply and well lightened with old manure so that the tubers may be able to expand freely. The plants are extensive trailers, and are usually grown where they may have some tree to run up, or else have a bamboo-trellis placed for their support. The crop will be ready for digging up in December.

The proper mode of cooking Yams—as is pretty well known to all Indian cooks—is, after the tuber has been boiled, to bury it for half-an-hour or more beneath the hot wood-ashes. By this means all moisture becomes dried out of it, and it is rendered nice and mealy.

The following directions, with regard to the cultivation of the Chinese Potato, D. japonica, given by M. Montigny, then French Consul, who sent it from Shanghai to France, no doubt would apply equally well to all other kinds of Yam grown in this country:—

"For propagation the smallest roots are set apart. In the spring the roots are taken out and planted in furrows pretty near each other in well-prepared ground. They soon sprout and form prostrate stems, which are made into cuttings as soon as they are six feet long. As soon as the cuttings are ready, a field is worked into ridges, along each of which is formed a small furrow, in which the pieces of the stem are laid down and covered with a little earth, except the leaves. If the weather is rainy, the cuttings strike immediately; if dry, they must be watered till they do strike. In fifteen or twenty days the roots begin to form, and at the same time lateral branches appear, which must be carefully removed from time to time, or the roots will not grow to the proper size."*

Mr. J. Henderson, of Kingskerswell, South Devon, likewise gives the following practical directions :—

"The manner in which the Chinese cultivate it is extremely simple. The earth is first formed into ridges, when small tubers or portions of large ones are planted on the top, at about three feet apart; after the plants have attained a little strength, the shoots are spread over the sides of the ridges, and pegged down at the leaf end, six or eight inches from each other (care being taken to cover the joints or parts pegged down with a portion of earth), when they soon strike root and throw out tubers; by this means immense quantities of roots, of the size of early-framed kidney Potatoes, are raised on a comparatively small piece of ground. The above is the ordinary Chinese mode of culture; but to obtain them of a large size, small tubers, or portions, are planted on ridges, from ten inches to one foot apart, and the plants are allowed to grow freely till late in the autumn, when the foliage is cut away and dried, or partially dried, and given to cattle; the tubers by this means attain on an average 1 lb. and upwards in wealth."†

If the vines are trained on supports the yield of tubers is much greater than if the vines are allowed to trail on the ground.

Not grown on the hills.

ZINGIBERACEÆ (SCITAMINEÆ)

ZINGIBER OFFICINALE.

GINGER.

Udruk—Sonte.

There is no difference, it is stated, between the Ginger of this country and that of Jamaica, but what results from the way in which it is cultivated.

The planting sould be made about the end of May, both on the hills and on the plains, just before the rains commence, in a very

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*"Gardeners' Chronicle," 22nd July, 1854.
†"Gardeners' Chronicle," 23rd December, 1854.

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rich light soil. Drills should be made two feet apart and two or three inches deep. In these, pieces of the tuber should be laid at sixteen inches apart, and covered in with soil. When the plants begin to grow they must be earthed up, and, if the rains have not set in, well-watered. About January the roots will be ripe for taking up, when, having been well washed, they may be stored away. The average return is 1,200 lbs. cured Ginger per acre.

For ordinary use, however, it is hardly worth while to cultivate Ginger in a garden, as it may always be purchased cheaply enough in the bazar ; but if it be required for making a preserve of, it must be grown for that especial purpose. In that case the tubers should be taken up as early as possible after being formed, in their youngest and tenderest condition : This will be when the plants are not more than five or six inches high.

The following directions for making the preserve may perhaps be found useful :—

Scald the tubers, wash them in cold water, and peel them clean. This will take some three or four days to accomplish. Make a syrup of the proportion of a pound of sugar to a pint of water, into which stir gradually the beaten whites of two eggs. Boil and well skim it. When quite cold, pour it over the Ginger ; cover it up and let it remain so two or three days. Then pour it off from the Ginger, boil, skim, and clarify, if necessary, the syrup again, and when cold pour it a second time over the Ginger, and let it remain three or four days. Then boil the syrup again, and pour it hot over the Ginger. Proceed in this way till you find the syrup has thoroughly penetrated the Ginger, which you may ascertain by its taste and appearance when you cut a piece off, and till the syrup becomes very thick and rich. If you put the syrup hot to the Ginger at first, it will shrink and shrivel.*

Grown in the warm, moist valleys by hillmen. Extensively cultivated on the plains of Malabar and Kanara. Propagated by division of the rhizome.

CURCUMA LONGA.

TURMERIC—MANJAL.

Huldee.

Turmeric, of which such large quantities are used for curries, may be always procured cheaply enough in the bazar, and is rather an agricultural product than one to be raised profitably in the garden.

The cultivation of it is carried on in the same way precisely as that of Ginger or Arrowroot. The tubers are put down in May, a foot or more apart, in rows. The plants are earthed up when about eight inches high, and then require no further attention till the crop is ready for taking up in the cold weather.

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*Condensed from Miss Leslie's Cookery Book.

Not grown on hills, except in the warm valleys. Much grown in the South of India.

MARANTA ARUNINACEA.

ARROWROOT.

Genuine Arrowroot, such as that exported from Surinam and Bermuda, is the produce of the plant above named; but Arrowroot of a spurious kind is also obtained from the roots of two or three other plants. For example, *Curcuma angustifolia* is cultivated in Ganjam, parts of the Circars and the West Coast of the Madras Presidency. This is of a very inferior kind, and may be distinguished at once from the genuine, which is pure white, by its yellow tinge and by its not thickening in boiling water. Genuine Arrowroot may also be discovered by aid of microscope, its granules being very distinct from those of any spurious kind. *Hitchenia glauca* is the wild Mahableshwar Arrowroot.

The roots of true Arrowroot should be put in the ground in the month of May. Drills should be made about three or four inches deep and two feet apart, in which the roots should be laid at a distance of a foot and-a-half from one another, and the earth covered over them. As the plants grow, they should be earthed up in the same manner that Potatoes are. They love a good rich soil, and plenty of water during the time of their growth ; which latter, indeed, they get naturally, as their growing time is during the rains. They bear their small white flowers about August, and in January or February the crop may be taken up for use. A month or two previous, however, water should be entirely withholden, to allow the roots to ripen They are of a pure ivory-white colour, and should be as large as moderate-sized Carrots. The smaller ones should be reserved for a fresh planting and the pointed ends also of the larger ones, at the extremities of which the eyes are situated, should be broken off, three inches in length, and kept for the same purpose.

The mode of preparing the Arrowroot is very simple. The roots after being well washed should be pounded to a pulp in a wooden mortar. The pulp should be thrown into a large vessel of water, which will become turbid and milky, a portion of the pulp remaining suspended in it as a fibrous mass. The fibrous part should be lifted up, rinsed, pounded again in the mortar, thrown again into the water, lifted up a second time, rinsed, and then thrown away. The milky-looking water should be then strained through a coarse cloth into another vessel, and when the sediment has settled, the water should be poured gently off and clean fresh water poured upon the sediment. This, after having been well stirred up, should be strained through a fine cloth, and, on settling, the water should again be carefully and gently drained away. The sediment, which is then fine pure Arrowroot, should be dried on sheets of paper by exposure to the sun.

ORCHIDACEÆ

VANILLA PLANIFOLIA AND V. AROMATICA.

VANILLA.

The Vanilla plant thrives well and blossoms and fruits freely in Bengal; but the pods that have been produced and preserved here can hardly be considered satisfactory for use in confectionery. When kept a short time they have a somewhat sour smell, quite distinct from the fine, sweet scent emitted by those imported from the Mauritius, even after having been kept several years. Whether this arises from the climate being unfavourable to the maturation of the pods, or from the want of proper management in the curing of them, it is difficult to say. As the pods are not ready for gathering till December, it seems not improbable that they require more warmth during the two or three months when they are completing the ripening process than the climate of Bengal will afford them.

The mode of cultivation practised in the Mauritius, is to build at the base of some high tree a small rampart of brickwork, about a foot high, fill it up with a light soil of leaf-mould, plant in it the Vanilla plant, and brick over the surface of the soil. In a short time the plant will grow to a considerable height up the tree, clasping it with the ærial roots it throws out as it ascends.

The flower-pot, however, with suitable soil answers the purpose equally well as the rampart of brickwork; for in no great time the Vanilla plant, after climbing up the tree, disconnects itself almost entirely from the soil at the base of the tree, except by the old dried roots, which seem no longer to convey any nourishment to the plant.

The plants continue blossoming from February to April. The flowers expand early in the morning, at which time they require to be fertilized artificially, or, in this country at least, they will not set fruit. The operation consists in introducing the points of small tweezers into the mouth of the flower, handling it gently, and extracting from the upper lip a small piece of the membrane which encloses the pollen. If not successful, and impregnation has not taken place, it will be known by the circumstance of the flower not dropping from the ovary for full a month or more. If successful, the flower drops off in a day or two.

The plants may likewise be grown with great success in pots, trained upon a bamboo trellis fixed in them ; and, possibly, in Bengal this would be found the best plan to adopt, as the plants would thus not only be at command during the whole period of their growth, but might be removed at the commencement of the cold season to some warm sheltered situation instead of being left exposed as they usually are, to the full force of the cold winds.

Mr. Thwaites directs that "the pods should be gathered when they are commencing to turn yellow at the apex, and killed by immersion for a few seconds in boiling water, or by exposure to the sun. I prefer the latter method, and dry them subsequently in the shade, or with occasional exposure to the sun, upon tin plates."*

The plant is raised readily from cuttings, which come into bearing in the third year.

Ample directions for the culture of the Vanilla plant and the preparation of the pods, as practised at Bourbon, will be found in Volume IX of the *Journal of the Agri-Horticultural Society.*

Not grown on the hills for its pods ; but occasional plants are met with in stoves.

Vanilla is successfully and profitably grown in the French settlement of Pondicherry in the Madras Presidency. It is also cultivated to some extent at Bangalore, from whence a great many plants and cuttings have been distributed to coffee planters and the general public.

Curing is best done on movable tables covered with felt or cotton wool. Pods should be harvested when they become pale green approaching to a slightly yellowish tinge of colour. When left too long the pods are apt to split in curing.

EUPHORBIACEÆ

MANIHOT UTILISSIMA

Tapioca—Manioc or Cassava Plant.

The Tapioca plant is a graceful shrub growing up to eight feet high with curious palmate leaves. In leaf it much resembles its cousin *Manihot glaziovii*, the Ceara rubber. In India proper, Tapioca cultivation on a large scale is seldom seen. It is a crop beloved by the Chinese, and it is found in great quantity in the Straits Settlements. Experiments show that

(1) Tapioca will grow in many different kinds of soil provided they are not stiff and heavy.

(2) Tapioca can be grown without irrigation if planted at the beginning of the monsoon.

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* Journal of the Agri-Horticultural Society, Vol. XIII, p. 53.

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(3) Tapioca responds readily to manuring.
(4) The yield per plant varies from 3 oz. to 17 lbs., according to locality, treatment and age of plant.
(5) Waterlogging is fatal. If waterlogging is prevented the plant will tolerate at least 60 inches rainfall.
(6) If the tubers are washed, the bark removed, the remainder sliced and boiled for one hour, and the water drained off, it would appear that the tubers are then fit for human food.

This last mentioned process is necessary because the tubers contain a cyanogenetic glucoside. From this body, prussic acid is formed. Unless the glucoside is broken up and the prussic acid volatilised by prolonged boiling the tubers are poisonous to man.

The plant is propagated by stem cuttings of one foot long. These are placed two feet apart, in rows four feet apart. The crop is ready in 10 to 12 months from planting.

POLYGONACEÆ

RHEUM RHAPONTICUM

R. undulatum.

RHUBARB.

A vegetable extensively cultivated in Europe, for the delicious tarts and preserves made of its large thick leaf-stalks.

There seems, indeed, little probability that Rhubarb raised from seed can ever be cultivated successfully in the plains of India, for seedlings take two years before they become fit to be cut for table use—an age they could never attain here, as the plants will not live through the hot season.

But as Rhubarb is cultivated in the Nilghiris it is not improbable that were plants of one or two years' age brought down thence in October, and planted out, two feet apart, in well-manured ground in a shady situation, and abundantly watered, they would yield a supply of cuttings for the table in February. This might easily be tried and, if found successful, would well repay the trouble and expense.

In the south, Rhubarb can be grown profitably at elevations exceeding 4,500 feet. Now that railways abound, there should be no difficulty in transmitting partially grown plants for final growth in Northern India.

When in full vigour of growth, Rhubarb delights in very rich manure ; and requires a shady situation.

It can be grown to perfection on the hills. Sow the seed from March to May, and plant out in good rich soil as soon as the seedlings have made the first four leaves. They will require no further attention beyond regular watering during the dry months, and proper drainage during the rains.

RUMEX MONTANUS.

FRENCH SORREL.

This plant has large succulent leaves of the size of those of a Cos-lettuce, and less acid than those of the common Sorrel, which in appearance it in nowise resembles. It is an excellent ingredient to use in soups, and serves to impart a peculiarly fine flavour to omelettes.

Dr. Fabre-Tonnerre had it in his garden at Calcutta thriving well, and available for use all the year through. Even in Europe it requires a shady situation, more especially therefore will it do so in this country. It requires, no doubt, a rich soil abundant watering, as the quicker and more luxuriant its growth the milder and more agreeable its flavour. It is easily raised from seed: but the more ordinary mode of propagation is by division of the roots.

CHENOPODIACEÆ.

SPINACEA OLERACEA.

SPINACH.

Pâlak.

There are two varieties of Spinach: the prickly-seeded with triangular leaves, and the smooth-seeded with round leaves. In Europe these are sown at two distinct seasons, but in this country the same season is suited to each.

The seed should be sown in October, when the rains are over, broadcast, or in drills, which is the better plan. The distance between each drill should be a foot, and between each plant in the drills nine to twelve inches. Spinach loves a rich soil and a shady situation well watered. The young plants, if not protected by a net or some other means, are very liable to be devoured by sparrows. On the hills sow from March to October. In the South, Spanich can be grown all the year round from 2,000 feet elevation upwards.

BETA VULGARIS.

BEET.

Chukandar.

This vegetable appears to be far more generally cultivated in India than it is in England. When sliced and dressed with vinegar, It affords during the cold season an immediate and most delicious pickle. Care should be taken that the root be in no way damaged or cut open before it is boiled, or the colouring matter will be discharged, and it will in consequence lose much of its handsome appearance.

There are several varieties of the vegetable, but they vary more perhaps in form and in colour than they do in flavour ; for the table that of the deepest blood-colour is generally held in highest estimation, as it is undoubtedly the handsomest. The test of a good beet is that when cut the white woody rings should be inconspicuous and the red succulent tissue should predominate.

The end of September is a suitable time to commence sowing ; previous to which the soil should be tolerably manured, dug deeply, well broken up, and rendered as loose as possible.

The seeds should be sown thinly in rows twelve inches apart, and thinned out to nine or ten inches between plants later on. The seed usually germinates in three days.

The young seedlings being much of the colour of the soil in which they grow, are hardly visible at first. The ground therefore should be narrowly examined before it be concluded, as it often prematurely is, that the sowing has failed.

Sparrows are excessively fond of the young plants : where, therefore, these birds are numerous, it is indispensable that a net should be spread over the ground at the time the seed is sown, and kept there till the plants have attained a considerable size, otherwise not a vestige of them will be left.

It is not an unusual plan to make sowings of Beet in seed-pans, and when the plants are about six inches high, to put them out, in a piece of ground prepared for them. The advantage of this method is that it admits of the sowing being made earlier, and so, of course secures an earlier crop, but the transplanting as done by the Indian mâlee or coolie, is likely to damage the roots.

A second sowing, about a month or six weeks later, may be made for a succession. Abundant irrigation is very beneficial to this vegetable, especially frequent watering with liquid manure, to which the addition of a little salt has been recommended. Frequent loosening of the soil is also highly advantageous, and more particularly so is the removing of the earth from the upper portion of the roots, and the taking away of all small fibres that form upon them. Beet-root succeeds well after Leguminous crops.

Beet-root is often produced of an enormous size, but the best for culinary use is that which has attained to little more than the thickness of a man's wrist. When grown to a much larger size it is apt to become woody, and disfigured with whitish concentric rings.

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On the hills begin sowing in March. Succession sowings can be made up to September, if necessary. They must be frequently watered during the dry months. A rich soil is indispensable.

BASELLA CORDIFOLIA AND B. ALBA.

MALABAR NIGHTSHADE.

Poee.

A climbing plant, with very succulent stems and leaves used as a pot-herb much in the way of Spinach : cultivated by natives against their dwellings in all parts of India, but hardly recognised as a garden vegetable by Europeans. Propagated by seed during the rains or by root or stem cuttings taken from old plants in the rains.

Not met with on the hills.

AMARANTACEÆ.

AMARANTHUS OLERACEUS.

Ság.

This and its varieties are extensively cultivated all over India : the plants are fit for use during the rains ; the part eaten is the soft succulent stem, which is sliced into small pieces, and dressed in the manner of French Beans.

Roxburgh says there are "several varieties cultivated as pot-herbs, of which the following are remarkable :—

"*α*. Viridis.—The common green sort. Most cultivated.

"*β*. Ruber.—A beautiful variety, with a clear bright-red stem, branches, petioles, nerves, and veins, and the leaves themselves rather rust-coloured.

"*γ*. Albus.—All the parts that are red in *β* are here of a clear, shining, white colour. Much cultivated in Bengal.

"*δ*. Giganteus.—Five to eight feet high, with a stem as thick as a man's wrist. The tender succulent tops of the stems and branches are sometimes served up on our tables as a substitute for Asparagus."

AMARANTHUS GANGETICUS.

Lál Ság.

The same remarks apply to this as to the last. Roxburgh says :—

"Varieties of this species are found, many tolerably permanent, differing chiefly in colour from green with the slightest tinge of red, to rufous, liver-coloured, and bright red. They are more generally used among the natives of Bengal than any other species or variety."

LABIATÆ.

MENTHA VIRIDIS.

MINT—SPEARMINT.

Podeena.

The Mint of this country appears to be a different variety, if not a different species, from the well-known herb of that name of the English gardens. The Indian Mint has a roundish crimped leaf, not longer than broad ; very deficient in flavour, especially when cooked. The true English Spearmint has leaves comparatively smooth, and, as its name denotes, lance-shaped, more than twice as long as broad. The herb loses in course of time the full strength of scent and flavour which it possesses when grown in the hills, and becomes no better for culinary use than the common Indian kind.

The plant is most easily propagated by division of the roots. Every sprig nearly will strike, if planted in a damp, shady situation. The plants are put in six inches apart in rows one foot apart. It should be planted in October on the plains and in April on the hills.

MENTHA PIPERITA.

PEPPERMINT.

Peppermint in habit and appearance much resembles common Mint. It thrives well in this country, delighting in a good soil and a shady situation. It is easily propagated in the cold season by setting out in the ground sprigs, pulled off from the plants, with a small portion of root attached to them, and keeping them well watered and shaded till thoroughly established.

Planting distances and times as for *Mentha viridis.*

MERIANDRA BENGALENSIS.

BENGAL SAGE.

This herb is in general use in Lower Bengal for culinary purposes under the name of Sage, for which, however, it is rather an indifferent substitute. It has much larger leaves, but its appearance is sufficiently similar to lead a casual observer to mistake it for the true Sage of the English gardens. It is easily propagated by division of the roots.

SALVIA OFFICINALIS.

SAGE.

The true Sage of European gardens is in the climate of India a very delicate plant, and can be kept alive through the hot and rainy seasons only with great care. Dr. Voigt states that the Sage plant was introduced into the Calcutta Botanical Gardens in 1809, and that during the five subsequent years it never flowered.

It is easily raised from seed in the cold season. The sowing had better not be made before November, or the young seedlings will be nearly sure to damp off and perish. The sowing, moreover, is best made in the open ground in a well-manured soil, protected from sun and rain by a matting supported on a bamboo frame. When the plants have four or six leaves, they may be thinned out to four inches apart and the matting removed. By the end of February, they must be transferred to some spot sheltered from the full power of the sun, and protected likewise from heavy rain, or they will be sure to die.

There is, however, so much difficulty in keeping them through the hot and rainy seasons, that the best plan perhaps is to raise a large number of plants in the cold season, and when they are in full vigour, just upon the approach of the hot season, to pull them up and pluck off the leaves, and having carefully dried them, store them away in well-corked bottles for future use.

On the hills, sow in March and April.

ORIGANUM VULGARE.

MARJORAM.

Marjoram is a herb of very little value for use in the kitchen. It grows well in the open ground all the year through, and requires little or no attention bestowed upon its cultivation. It is best, however, to renew it annually in October which may be easily done either from seed or by dividing and putting out in fresh ground the roots of the old plants.

On the hills, sow in March and April.

THYMUS SERPYLLUM.

THYME.

Dr. Voigt states that this herb continued in existence in the Calcutta Botanical Gardens for a period of more than 20 years without blossoming. Others, however, have experienced the greatest difficulty in keeping it alive even through a single hot and rainy season, and have come to the conclusion that the best method of obtaining a supply of it for domestic purposes is to treat it in the same manner as recommended for Sage, that is : Sow the seed of it annually in October and on the approach of the following hot season, gather all the leaves from the young plants, dry them well but not in the sun, and then keep them in well-corked bottles for use when required.

On the hills, sow in March and April. Thyme is indigenous to the temperate regions of India, from whence supplies of the herb can easily be procured.

SOLANACEÆ.

CAPSICUM.

Capsicum annuum.—The Herbaceous Capsicum ((annual).
Varieties—
(1) acuminata.—The Common Chilli.
(2) grossa.—Spanish or Monstrous Pepper.
(3) cerasiformis.—Cherry Pepper.
(4) longa.--Purple Chilli.

Capsicum frutescens.—The Shrubby Capsicum or Bird's-eye Chilli (perennial).
Variety—
(1) baccata.—Brazil Pepper or Pimenta.

The above-mentioned varieties are the main types. Some of these have numerous sub-varieties. The Bird's-eye Chilli is very fiery and is used for Chilli vinegar.

With a well distributed rainfall Chillies can be easily grown as a dry crop. The land must be worked up to a fine tilth, and manured with 20 cartloads (10 tons) farmyard manure per acre. Seedlings are sown on special beds with hand-watering early in May and the seedlings transplanted about mid-June at a distance of two feet each way. It is best to transplant seedlings on to the side of ridges. The crop must be regularly hoed. If artificial watering is needed, once in 15 days is enough. Three months after transplanting the first picking is ready. From three to five pickings are got. The Chillies are then dried in the sun. A curious disease of unknown origin affects Chillies. The plants produce numerous small curled leaves and are unhealthy. No remedy is yet known. Chillies may also, like Potatoes, suffer from the attacks of mites. The remedy is to dust with sulphur.

Sow the seed from March to June on the hills.

SOLANUM TUBEROSUM.

POTATO.

Aloo—Uralagadde.

Potatoes do best when cultivated in the cold weather as an irrigated crop. They are, however, in some places grown to a limited extent as a monsoon crop. Seed Potatoes for Western India are imported by the ship-load from Italy. Many attempts have been made to store seed Potatoes in Poona and Mahableshwar so as to be independent of imported seed Potatoes, but all these attempts have failed. The temperature and moisture conditions are such that rot sets in and the stored Potatoes are lost. There is also often considerable loss in store from the Potato moth (*Pthorimœa operculella*), In cold storage seed Potatoes keep well, but cold storage is a very limited quantity, and moreover the cost of keeping seed Potatoes in cold storage does not compare favourably with the cost of importation.

In the field, in Western India, Potatoes suffer from a bacterial disease (the so-called "ring" disease), from a wilt (due to a *Fusarium*, a soil fungus), and to another soil fungus, *Rhizoctonia*. A mite also attacks the foliage of the plants and on account of the scorching of the leaves which it produces is called *Tambera*. This mite is easily controlled by dusting sulphur on the leaves, and the ring and wilt diseases by using newly-imported seed. The *Rhizoctonia* disease is not serious. The Potato blight so common in Britain is not known in Western India, but occurs in Bengal.

The supply of Potatoes at Calcutta and its vicinity is kept up throughout the year by means of crops raised in the plains and on the hills at two distinct seasons. Those sown in the middle of October in the plains are dug up in February, and continue in use till August or September, at which time supplies are obtained of those that have been grown in the hills, where these were planted in perhaps March or April.

At Bangalore and adjacent villages, where the Potato is cultivated on a large scale, two crops are taken annually; one being planted in May or June, and the other in October or November. New varieties have been frequently introduced by the Mysore Government, some of which have become regularly domesticated. One popular variety known locally as "Rickett's gadde" indicates the name of the officer who introduced the tuber. "Gadde" is the Kanarese term for tuber.

For the principal crop on the hills, plant about the last week in March and the middle of April. The cultivation is the same as that on the plains.

SOLANUM MELONGENA.

BRINJAL—EGG-PLANT—AUBERGINE.

Begoon Badane.

One of the most common of the native vegetables of this country, cultivated in all parts of India. There are two common varieties, one with the fruits of the size of a large Orange, and in form like an egg; and the other with fruits more of the form of a Cucumber. The fruits of both kinds are of a fine, polished, deep purple colour, sometimes mottled. There are many other varieties.

At Patna there are as many as five varieties of this vegetable, thus named and distinguished :—

1. *Mánik*: three to five to the seer; globular, black.
2. *Gorbhanta*: smaller.

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3. *Bara Másiya:* cylindrical, black.
4. *Valayeti:* oblong, almost cylindrical, white.
5. *Bhátin:* many prickles; fruit cylindrical.

In Northern India three sowings are made per annum—in October, February, and July. A constant supply of Brinjals is thus assured. The plants should be raised in seedbeds and transplanted on to ridges 18 inches apart and with 15 inches from plant to plant. The soil treatment is as for Chillies. From the rains sowings the plants are bigger and more trailing and may need support. In the Deccan the seed is sown at the beginning of the rains.

The vegetable comes into season in August, and remains in season from that time to the end of the cold weather. It is valuable for the table during the first two or three months, when few vegetables of any kind are attainable.

Largely cultivated by hillmen in the warm, moist valleys. The seed is sown in April and May, and the vegetable is in season from July to September.

LYCOPERSICUM ESCULENTUM.

TOMATO—LOVE-APPLE.

Biláettee Begoon.

The cultivation of this plant generally resembles that of the Brinjals. Sowings can be made from July to October and the seedlings transplanted on to ridges three feet apart with one and-a-half feet between plants. The plants often require support as they come into fruit. The obscure disease attacking Capsicums occasionally shows itself in Tomatoes, but otherwise they are very easy to grow, and seedsmen offer numerous varieties. The wise gardener will have one variety for boiling, one for eating raw, and one for stewing as a fruit. The peach-blow variety is excellent for the last named purpose. The fruits are ready in four months from sowing.

On the hills the seeds should be sown in pans, with bottom heat, in March; in April they may be sown without bottom heat. The seedlings should be put out in good soil, when the sixth leaf has formed.

There are few gardens in India where Tomatoes cannot be grown at some time of the year. Their culture should be encouraged for it has been shown that they are very rich in vitamins. They are best eaten raw, after having scalded them with boiling water to facilitate the removal of the skin. There is no reason why anyone should buy distorted Tomatoes in the bazar, when full-fleshed smooth Tomatoes can be grown by a small expenditure on good seed from well-known seedsmen.

CONVOLVULACEÆ.

BATATAS EDULIS.

SWEET POTATO.

Shukker-kand.

One of the native vegetables of this country, and in common cultivation in all parts of India. The plant is of a very extensively trailing habit, and produces large handsome pink flowers with purple eye; the tubers it bears are of a long, cylindrical form, about an inch or more in diameter, and have a Potato-like mealy consistency, with a sweetish taste. There are two varieties, the one with red, and the other with white tubers. The red tubers are accounted the best. When Potatoes are not procurable, they serve as a useful substitute, though their sweetness is far from agreeable to some persons.

Stem cuttings may be planted out in June, about a foot and a half apart, on ridges, and the crops will be ready for use in the cold season. The plants require light soil, preferably sandy, and must be watered in dry weather. The crop is ready in three to four months from planting, the leaves turning yellow when the plants are mature.

On the hills it is not cultivated in gardens, but the hillmen plant that tubers in April and May in the warm, moist valleys.

COMPOSITÆ.

HELIANTHUS TUBEROSUS.

JERUSALEM ARTICHOKE.

This delicious vegetable is cultivated successfully in most parts of India. The tuberous roots are the parts used for the table, and are in season in November. The ordinary soil of the garden generally suits it without the addition of much manure. The tubers are put into the ground from March to May, in rows two feet apart, and with one foot between each plant, and three inches deep. The plants grow to three or four feet high, and produce their Sun-flower-like blossoms in abundance; these possibly it would be of considerable advantage to remove before opening. The fruits should on no account be allowed to form. The tubers are fit for use by November.

When the tubers are taken up, they should be stored away in large flower-pots, well covered in with earth, or they will be liable to shrink and shrivel from exposure to the air.

This vegetable is not commonly cultivated on the hills. But tubers put down in April will grow vigorously and yield a plentiful crop in August.

CSL

CYNARA SCOLYMUS.

GLOBE ARTICHOKE.

Háthichuk.

This vegetable is better known and more generally cultivated in India than it is in England. Probably it is from the very large space the plants take up that they are so seldom seen in ordinary English gardens.

Any time from mid-August to the end of October is suitable for sowing the seed, which usually germinates in about ten or twelve days after being sown. The sowing should be made in seed-pans under shelter from the rain, but exposed as much as possible to the light, otherwise the young seedlings are very apt to damp off.

The plant bears a long tap-root, which is liable to become broken if allowed to grow large before being transplanted. They are best planted out when about a hand high at a distance of three feet apart at least. Like all other vegetables, they thrive best in a rich soil. Elephant's dung has been recommended as a manure, but has been used with no marked advantage. Sea-weed is the manure which, when obtainable, is said to suit them best, and in default of that any manure in which salt is an ingredient. Salt-petre is a very good manure. The plants require to be grown in open unshaded ground, which it is desirable should be changed each season. They come into bearing towards the end of February. Some few will survive through the hot and rainy seasons, at the close of which they should be dressed with a liberal supply of manure. These will be productive considerably earlier than those raised fresh from seed. Plants, however, raised fresh from seed produce far superior heads.

In the Upper India plants raised from American or European seed prove abundantly productive of fine large heads during the months of March, April, and May. But in the neighbourhood of Calcutta, only what is called acclimated seed can be used with any prospect of success, as it is very rare indeed that a single head can be obtained from plants raised from imported seed. Nor is there any advantage in preserving plants that have proved unproductive the season they were raised, until the succeeding one, for they continue as barren then as they were at the first. Continual shifting of the plants, when young, has been recommended in order to promote fruitfulness. On trial this method has not proved a success.

Those who have once become possessed of acclimated seed can of course secure a succession of it from year to year by reserving a few of the earliest-formed heads for ripening.

CHARD.—A name given to the young offsets of the Artichoke when submitted to the same mode of cultivation as the Cardoon.

On the hills, the seed should be sown in March and April. When plants are once established, they last out the winter with a little protection, and go on yielding a plentiful crop of very superior heads for three or four years.

CYNARA CARDUNCULUS.

CARDOON.

Between this vegetable and the Artichoke there is scarcely a perceptible difference, but the mode of cultivation is altogether different. It is not much cultivated anywhere, and seems to be hardly known in India.

The seeds are sown at the same time and in the same manner as those of the Artichoke. When the young plants are about nine inches high, they are put out at a distance of one and-a-half feet apart in rows three feet apart in ground that has been well enriched with manure. Tehy are then treated much in the same way as Celery. When the vegetable has become blanched by being earthed up, it is ready for use, and is taken up and stewed like Seakale.

On the hills, same cultivation as for Artichoke.

CICHORIUM ENDIVIA.

ENDIVE.

There are several varieties of this vegetable, of which the two principal are the Batavian, or broad-leaved, often used for stews and the curled, called sometimes Capuchin's Beard, used as a garniture for salads. Imperial White Batavian and extra green curled are reputed varieties of Endive.

The seed should be sown from the midle of October to the end of November, broadcast and very thinly, in good soil. The young plants should be thinned out to 12 inches apart. They do not bear transplanting well. Those prove finest which are allowed to remain unmoved.

When the plants have completed their growth, they should be blanched by being tied up in the form of a cone with bandages of Plantain-leaf fibre.

On the hills, sow in March and April.

TRAGOPOGON PORRIFOLIUS.

SALSIFY.

A solitary bundle or so of this vegetable is usually exhibited at the Calcutta shows ; but it is not much cultivated in India. In England it is in very little request, and to many persons scarcely known. The root is the part eaten, and is, when ready, about three months from the time of sowing, of the thickness of a man's forefinger, and nine inches long.

The seed should be sown when the rains are over, either broadcast or in drills eight inches apart. The plants in the drills must be thinned out to six inches apart, and frequently watered. They require a soil that has been previously well dug up, and then lightened with a mixture of well-decayed manure and silver-sand or ashes. The roots are ready about February.

The seeds imported from England are very uncertain of germinating. The best plan, therefore, is to allow as many of the plants to run to seed as will supply a sufficiency for sowing the following season. The vegetable would probably suffer no deterioration by adopting this plan, as it is not one of those that have been brought to high condition by cultivation.

The American call it the Oyster-plant, from the fancied resemblance of its flavour to that of an oyster. As the mode of dressing it may not generally be known, the following is given :—

"Having scraped the Salsify roots and washed them in cold water, parboil them, then take them out, cut them into large pieces, and fry them in butter.

"Salsify is frequently stewed slowly till quite tender, and then served up with melted butter. Or it may be first boiled, then grated, and made into cakes to be fried in butter.

"Salsify must not be left exposed to the air, or it will turn blackish."*

On the hills, sow the seed in March and April.

SCORZONERA HISPANICA.

SCORZONERA.

This vegetable requires the same mode of cultivation as Salsify to which in most respects it is very similar, except that it has broader leaves, and that the roots are black and require to be scraped before being cooked. In Europe it is not considered fit for the table till the second year of its growth. In Firminger's garden at Chinsurah it continued in a thriving condition through the hot and rainy seasons, and produced its handsome lavender-coloured flowers in September.

On the hills, sow in March and April, and treat same as Salsify. Rarely grown in the south.

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* Miss Leslie's "Cookery Book," p. 195.

LACTUCA SATIVA.

LETTUCE.

Salâd.

There are two kinds of Lettuce, the Cabbage-lettuce and the long upright kind called the Cos-lettuce, each with numerous sub-varieties. It is a matter of taste which of these two is to be preferred. For sweetness and tenderness the Cos, when in perfection, will perhaps be the favourite. This kind affords also a very delicious dish when stewed. There is no vegetable of which the cultivator should be more careful about obtaining superior seed than the Lettuce. For the cold season crops country seed should be entirely rejected, and none but that of European produce sown.

A commencement of sowing may be made in the beginning of August. The seed is rather small, and in some cases may be in the ground perhaps a month or two before the whole that has been sown germinates. It is very liable to the depredations of insects, of the red ants in particular, which devour it greedily ; it is therefore a good plan to make the sowing in a large shallow seed-pan, and isolate this by placing it upon an empty flower-pot standing in a vessel of water. The soil used should be made light and mellow by mixing with it leaf-mould and a little sand.

The plants should be pricked out as soon as they have made their second pair of leaves, and planted out, at about eight or 10 inches apart, in a piece of ground of a light rich soil.

When plentiful, the seed may also be sown broadcast in the open ground and thinned out to six inches apart : those will be by far the finest Lettuces which grow up on the spot where sown as they always suffer more or less from transplantation. The plants may be assisted to form heart by drawing the leaves lightly together with string.

If two or three plants be reserved and allowed to run to seed, the seed thus saved may be sown almost immediately, and a supply of plants secured. which, if grown in a spot tolerably sheltered from the sun and excessive wet, will come into use during the hot and rainy seasons.

On the hills, begin sowing from March, and go on sowing successively every 15 days till September. The seeds should invariably be sown in pans, and the seedlings pricked out into beds when the fourth leaf has formed A better plan is to sow very thinly in yard-square beds under irrigation. If the sowing is carefully done no transplanting will be needed, and the growth will be larger.

CSL

UMBELLIFERÆ.

APIUM GRAVEOLENS.

CELERY.

Of this vegetable there are two principal kinds, the white and the red ; of each of these there are also several varieties. The red varieties in this country are of larger growth, and produce firmer and denser heads than the white ; but the white, when raised from good seed and well cultivated, are by no means inferior.

The perfection to which Celery may be brought depends, unquestionably, in a great measure, on the quality of the seed.

Celery takes a long time to complete its growth ; sowings, therefore, may be made as early as the beginning of August. The seed, however, which at a later and more congenial season germinates in about 12 days, at this early period may be expected to come up not until, perhaps, six weeks or two months after sowing, and then only partially. It should be sown in seed-pans in a light soil, and if the seedlings come up too thickly, they should be pricked out to about two inches apart, and remain till they become strong, healthy plants, three or four inches high, before being removed to their places in the open ground.

The usual mode of preparing the ground for the young plants is to dig trenches 18 inches deep and as many wide. The trenches are then filled up with a compost of two-parts of well-decayed cow-manure to one part of common earth, to the height of nine inches. In these trenches the young plants are put 18 inches apart. They are then kept frequently watered, and about once a week supplied with liquid manure. Saline manure is said to be highly beneficial, and to tend to make the vegetable crisp.

Most cultivators commence the process of blanching by earthing up the stems at a very early period, and continuing to do so till the vegetable is taken up for use. One method often employed is to take a piece of large bamboo, 18 inches long, and slit it in two ; and, having pointed the ends, drive them into the earth, one close on each side of the Celery plant. The plant thus encompassed by the bamboo is earthed up. Some place earthenware pipes over the plants for the same purpose.

But with the adoption of either of these plans the plants are very apt to decay. Sir J. Paxton says that earthing up much impedes the growth of the plants and that they should be allowed to grow to maturity before this is resorted to, when it takes about a fortnight to blanch them. Firminger acted upon this statement, and found it result both in great advantage to the plants and in the saving of a vast deal of trouble to the mâlee.

A more economical mode of proceeding, and one that Firminger practised himself, is to dig a row of circular holes in the ground, nine inches in diameter, a foot deep, and six inches apart. Fill these with soil, well enriched with manure, within three inches of the top. Put one young plant in each, and then proceed with the cultivation as above directed.

Celery takes about six months from the time of the seed germinating to attain its full size ; but for the table it is preferable when taken up after about five months' growth. Nothing whatever is gained by the attempt to grow Celery of an extraordinary size ; as the great chance is that when the vegetable is taken up it will be found overgrown, unsound, perhaps worthless. Or if this be not the case. at least so much of the outer leaves will have to be cut away as coarse and uneatable as to reduce the size to what it was a month previous, when the whole plant would have been found perfectly sound and of far finer flavour.

Celery may be grown in India quite equal in quality, though not, perhaps, in size, to any raised in Europe.

For a succession crop a second sowing may be made about a month after the first. The first sowing, however, will generally supply as many plants as are required for the season.

On account of the uncertainty attending the germination of seed sown in August, some cultivators raise their seedlings at the close of one cold season and keep them on through the hot and rainy months, to plant out early at the commencement of the following. This, however, is almost needless trouble.

On the hills, the first sowing should be made as early as the middle of February, in a seed-pan with bottom heat. The seedlings should be pricked out into other pans and kept under glass till the last week in March, when they should be planted out in prepared beds, and afterwards treated as recommended for the plains. Successive sowings may be made in April, May, and June, the seedlings from which can be planted out at once into their prepared beds.

APIUM GRAVEOLENS VAR RAPACEUM.

CELERIAC—TURNIP-ROOTED CELERY.

A variety of Celery, of which the part eaten is the root, developed by cultivation to a very large size, and having then a very agreeable, filbert-like flavour.

It is cultivated in the same way as Celery, except that no earthing-up for blanching is resorted to. The plants delight in a great abundance of water. Few persons, however, will perhaps be induced to cultivate it, as it entails nearly the same amount of trouble as Celery, to which on the whole it will generally be considered inferior.

PETROSELINUM SATIVUM.

PARSLEY.

Peetercelee.

Parsley-seed may be sown about the middle of September in seed-pans, placed somewhere under shelter from the heavy rains. The seed germinates in about 10 days. When the plants are three or four inches high, they may be planted out in a row, about half a foot apart, in a shady place, and kept well watered.

About March the plants will yield seed, some of which should be stored away, and some sown immediately for a fresh supply of plants for use during the hot and rainy seasons.

On the hills, sow from March to September.

FŒNICULUM VULGARE.

FENNEL.

This herb thrives well in Bengal, also in Gujarat and Khandesh in Western India, and where it has been once grown will come up each cold season afterwards from seed self-sown. No particular care is required in the cultivation of it ; there is, however, so very little use to which it can be applied in cookery, that it scarcely merits a place in the garden. Sow the seed in October on the plains, and in March and April on the hills. It does not succeed so well in the south, except at high elevations.

PEUCEDANUM SATIVUM.

PARSNIP.

This excellent vegetable—of which there is none better for a service of roast beef—is becoming popular in the cooler parts of India. At Bangalore, it is commonly grown for market consumption. Like all root crops of its class it requires a rich soil which is comparatively free of stones, and easily penetrated by the tap-root. The best varieties to grow are the Hollow-Crowned, Student, and Large Guernsey. The crop attains maturity in five months, but roots which are about two-thirds grown are best for table use in this country, where esculents develop too much woody fibre in their maturity. The Parsnip does excellently on the hills, where it can be grown successively nearly all the year round. General treatment, the same as for Carrot or Beetroot.

DAUCUS CAROTA.

CARROT.

Gajur—Gajina gadde.

There are two very distinct kinds of Carrot: the long-rooted and the Horn kind, of a blunt spindle form, and not going down far into the earth. These latter are the more easily cultivated, come into season earlier, and are tender and of a mild flavour; but the long-rooted have more of the true Carrot taste, and are the preferable vegetable.

Carrots are now greatly improved in home cultivation. Sutton's New Red Intermediate, Champion Scarlet Horn, and Early Gem, are each desirable varieties for Indian gardens.

This vegetable, especially the long-rooted forms, requires a deeply worked soil, mixed with plenty of old farmyard manure at a depth of 6 to 15 inches. The land, however, should not have been *recently* manured when Carrots are planted or the roots, coming into contact with the raw manure, become forked and misshapen.

Sowing may be commenced about the middle of October, when the rains are over. A good, loose, and deeply-dug soil is desirable for every kind of Carrot, but not so indispensable for the short or early Horn as for others. The seed is more commonly sown broadcast, but the better and more economical plan is to sow it in drills. The drills should be in rows, eight inches apart. If the seed be mixed, and rubbed together with a little sand, the sowing may be managed much more easily. The plants when they come up in the drills should be hoed out to six inches apart. As they make growth, the ground should be well watered to enable the roots to penetrate into the earth.

Carrots, when they have attained to a size fit for table use, may be taken up and stored in large earthen vessels, filled up with well-dried earth closely pressed down. Before taking up the Carrots, it is well to cut away the green leaves down to the crown, so as to allow the tops of the roots to dry a day or two in the sun.

On the hills the early varieties should be sown, in a sheltered situation, as early as February. Successive sowings may be made from March to September every 15 days. They are best sown broadcast.

CUCURBITACEÆ.

MOMORDICA CHARANTIA, VAR. MURICATA.

Kurēla—Pavakayi.

An orange-yellow Gourd from four to eight inches long, thick in the centre, and pointed at the ends and covered with little blunt tubercles, of intensely bitter taste. The seeds are flat and immersed

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in red pulp. The pulp requires steeping in salt solution before use. It is cultivated chiefly in the rains. Much consumed by Indians and agreeable also to Europeans occasionally, as an ingredient to flavour their curries by way of variety.

The late General F. Jenkins stated two varieties were in cultivation at Patna :—

1. *Jethuya*: a plant growing in the heat of spring and dying with the first rains.
2. *Bara masiya* : which lasts throughout the year.

The seed is, however, commonly sown at the beginning of the rains, and the Gourd is in use in the cold season, when the plant has rather a pretty appearance, trailing upon the ground, with its small foliage, bright yellow flowers, and curious fruits.

Grown in the warm valleys only by the hillmen.

LUFFA ACUTANGULA.

Jhingu-Torooee—Hireballi.

A cylindrical, somewhat club-formed Gourd, about 10 inches or a foot long, with sharp ribbed projections from end to end. Roxburgh says : "Peeled, boiled, and dressed with butter, pepper and salt, it is little inferior to Green Peas." Regarding this statement, Firminger remarks : "I am afraid many would be disappointed who put reliance upon this statement : however, that is a matter of taste." The plant is an annual. Sowings are made from mid-March to end of July. Before sowing the ground must be well dug and manured with well-rotted farmyard manure at the rate of 20 lbs. per square yard. The usual practice is to plant seeds in the hot weather in small clumps, three feet apart each way, and let the vines trail on the ground. The rains sowings, however, are made in rows six feet apart, with one foot between seeds, and the vines supported on a rough trellis. During the dry season irrigation is required every fourth day, and the soil must be kept well hoed.

BENINCASA CERIFERA.

PUMPKIN—WHITE GOURD.

Châl Koomra—Pânee Koomra.

A very large, handsome, egg-shaped Gourd, averaging 5 lbs. in weight, covered with a pale greenish-white waxen bloom, and very popular with the people of the country. It has a very pleasing appearance upon their thatched dwellings where it may often be noticed in the most exposed and unprotected situations. On inquiry whether it was not liable very often to be stolen, Firminger was assured that other Gourds in a similar situation would likely enough be stolen, but that there was an especial respect paid to this, upon certain religious considerations, that rendered it perfectly safe.

The plant is grown in light sandy soil, and sown from mid-May to mid-July. Seeds are sown in clumps, five feet apart each way, and the strongest plant of each clump retained. The vines are either allowed to trail on the ground or are supported on a rough trellis. Like all Gourds it requires manure, but if the plot on which it is grown was heavily manured for some different crop in the cold weather, the Gourd itself needs no further manuring.

LAGENARIA VULGARIS.

BOTTLE-GOURD—FAQUIR'S BOTTLE.

Laokee-Kudoo—Soreballi.

One of the commonest of the native vegetables. One common form has the appearance of two oval Gourds united endwise or of an inflated bladder compressed by a cord around it. When woody this fruit is hollowed and used as a bowl by mendicants. Imitations of the bowl in brass are common articles for sale in curio shops. Other types of the fruit when dry are used as floats by fishermen, who construct a kind of life-belt out of them. There are many varieties of this Gourd with different shapes. It requires a heavily manured sandy soil, and is sown from February till August inclusive at intervals of a month. The seeds are planted in clumps, six feet apart each way, and the strongest plant retained from each clump. The vines soon cover the ground, and may be trained over any support. A vine is often trained over the owner's hut. At hill stations, sowings may be made from April to May, inclusive.

CITRULLUS VULGARIS.

THE WATER-MELON.

Tarbuz, Kalingada.

This is most successfully grown on the slightly sloping gravelly banks of rivers. Sowings are made from mid-January till end of March. Patches of soil, six feet apart from centre to centre, are well manured and a seed set in each. The strongest plant is retained in each group. In the early stages water is given once every four days, but later when the vines have covered the ground, once in 10 days. The fruits are ready in the hot dry months.

CUCUMIS SATIVUS.

CUCUMBER.

Keera—Savuteballi.

Firminger states : "There appear to be two kinds of this vegetable, either domesticated in this country or indigenous ; but neither have the delicacy or flavour of the European kinds.

1. The one grows to a very large size, is green when young and becomes darker as it ripens, and mottled with whitish stripes from end to end. This seems to be the Nepâl kind, described by Don and other writers as cultivated in Calcutta, and growing to as much as 17 inches long. I have not met with it of that size, but find that it is considered very large when of no more than 12 or 14 inches in length. It is hardly fit for eating uncooked when more than six inches long; much beyond that size it is tough and tasteless.

2. The other is of smaller growth, and of a creamy-white colour when young, turning to a rusty colour at the ends as it ripens. This answers nearly to the description of the one called the 'White Turkey.' It is the better of the two for stewing; cooked in which way it affords a very delicious dish during the rains, when so few other vegetables are to be had.

The plants of these two kinds have very long and powerful stems which are generally trained to run up a tree. The seed is sown in July or later, and the Cucumbers are in season during all the rains.

I have tried to raise Cucumber plants from American seed at the same period of the year, but uniformly without success. The plants made no growth, became sickly, and perished without blossoming. Towards the end of the rains, I have raised plants which blossomed and gave promise of fruit, but perished without yielding any. I have again sown the seed at the end of October, and the plants, put out in rich soil in large deep earthen pans, and trained upon a trellis in a verandah, have in two months' time produced small Cucumbers, with much of the flavour and delicacy of the European vegetable; and no doubt would have been much finer had I sown English seed of a superior sort. The great difficulty in cultivating this vegetable, when raised from imported seed, is to protect it from the ravages of certain small red beetles, which visit the plants in great numbers, and entirely devour the leaves as soon as the first four or five are formed. A rough framework of bamboo might be easily constructed, with common mosquito-netting stretched over it, which would perhaps be a safeguard against their depredations. The trifling expense thus incurred would be well bestowed to obtain this delicious vegetable in perfection."

Some of the fine English varieties have been cultivated with much success in the "Ram Newas" garden at Jeypore, in Rajputana. The seeds were sown in October. Grown in a glass pit, as they are at home, the English varieties do fairly well. Insects can then be fumigated, or otherwise destroyed.

On the hills, the English Cucumbers do remarkably well. The seed should be sown from March to May, and with slight protection yield fine fruits. A rich soil is necessary.

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For the outdoor cultivation of the country Cucumber sow the seeds from the beginning of March till the end of July six inches apart in rows five feet apart and stake up like peas. Water once every four days in dry weather.

CUCUMIS MELO.

THE MELON.

Karbuz, Karbuza.

The heavily manured soil of a dry river-bed suits this plant well. Seeds are sown from mid-January to mid-March, in pits containing manure at four feet apart each way and one strong plant left in each pit. Water is given every fourth day while the plant is young and until two-thirds grown. As the fruits become full sized the water must be reduced to the bare minimum necessary to keep the plant alive. The plants are not supported. The variety *utilissima* is somewhat hardier than the common melon. The fruits, when half grown, are oblong, green, and downy, in which state they are picked. Later on they become smooth and yellow and keep good for several months after plucking.

CUCURBITA PEPO.

PUMPKIN, SQUASH, VEGETABLE MARROW.

There are many forms of this Gourd, the variety *ovifera* being the common Vegetable Marrow. Sowings are made from mid-February to mid-April in well manured soil in clumps six feet apart each way and one strong plant left per clump. No support is required.

Firminger states : "In Lower Bengal, the seeds should be sown in the open ground about the end of October. The plants will require a large space of ground to trail over, so select a spot where they may have room for that purpose.

When the plants have formed about four of their rough leaves, they will, almost to a certainty, become attacked by the red-beetle mentioned as so injurious to the Cucumber. The mâlees usually throw wood-ashes over the leaves to protect them, but this obviously is very injurious to the plants. If, however, the plants can be preserved through the earlier period of their growth, a change seems to take place in the nature of their juices, in so much that the young leaves are no longer liable to be attacked by this insect, and in the course of a week or two, they will come into flower. When they have set as many fruits as the vine will bear, the flowers upon the plants should be removed. They require constant and copious watering, and occasionally with liquid manure.

Care must be taken to gather the Gourds whilst tender and ready, as they very rapidly become hard and woody. Miss Leslie, however, observes : "The Green or Summer Squash is best when the outside is beginning to turn yellow, as it is then less watery and insipid than when younger."

In the United Provinces, the sowing of the seed must not be made before the end of February, as the plants will not live in the cold season in that part of India. On the hills sow in April, and the vegetable will be in season in July.

CUCURBITA MAXIMA.

RED GOURD.

Sufuree Koomra—Lâl Koomra.

A brownish-red, globular-shaped, bluntly-ribbed Gourd, of enormous size, cultivated extensively by Indians for sale in the bazars where it is cut up and sold in slices ; in Firminger's opinion the most agreeable, by far, of any of the Indian Gourds. Dressed and cooked with boiled beef, as Carrots are, it can hardly be distinguished from them either in appearance or flavour. An annual ; seed sown in June and July ; vegetable in use during the cold season ; not often cultivated in gardens.

The best method to grow show specimens is to make "hills" of manure and earth six feet from each other (centre to centre) and each surrounded by a trench two feet wide and six inches deep. Seeds are sown in the hill and hand watered. Finally only one plant is retained and watered by directing the irrigation water into the trench. Female flowers should be artificially pollinated and finally only one fruit per plant retained. This should be kept off the earth by a grass bed and provided with a shade of bamboo matting or grass. Liquid manure should be given in the trench at intervals of three days as the fruit swells, and gradually decreased as the fruit ripens. The fruit will keep for a month after plucking.

TRICHOSANTHES ANGUINA.

SNAKE-GOURD—CLUB-GOURD.

Chichinga—Padavalu balli.

A large, greenish-white, club-formed Gourd, of the length of a man's arm, and about four inches thick ; of exceedingly rapid growth ; sliced, dressed, and eaten in the manner of French Beans during the cold season.

Seeds are sown from mid-April to mid-July six inches apart in rows six feet apart and the vines staked up. The plant is not grown above 4,000 feet elevation.

TRICHOSANTHES DIOICA

Pulwul.

A small, oblong, green Gourd, four inches long and two broad. Boiled whole or in quarters it affords rather an insipid dish, but being in season during the rains, when little else of the vegetable kind is to be had, it proves very acceptable. Not cultivated in gardens, as it is usually to be had cheaply from the bazar. It is in high favour with Bengalis. Propagated by cuttings, division of roots, and seeds, during the rains.

This will not live on the hills at all.

LEGUMINOSÆ.

PISUM SATIVUM.

PEAS.

Mutter.

There is no vegetable of which the seedsman's list contains so many varieties as of the Pea, and every year new varieties are added. Between several, however, scarcely any difference exists but in name ; and a selection of three, or at the most four, will be all that can by any possibility be needed in an Indian garden. Seed-dealers are usually able to advise regarding useful varieties.

Peas will not stand long continued rain and are usually planted towards the end of the rains. In districts of 20 inches rainfall or under there is no objection to sowing them at the beginning of the rains. Seeds are sown two inches apart in lines two feet apart for dwarf varieties and four feet apart for big kinds. The soil should previously be dug to a depth of one foot and enriched with manure at the rate of 10 pounds farmyard manure and four ounces bone meal per square yard. Irrigate between the rows in dry weather once a week and cultivate with a hoe after the soil dries on the surface. Successive sowings should be made at intervals of a fortnight for two months and the plants supported on branches set upright in the soil near the rows. Various insects, birds and other animals are fond of the seeds and seedlings. To protect the seed it is recommended to shake it up in a vessel with sweet oil and then transfer the oily seeds to a vessel containing a little red lead where they are shaken to make the poisonous powder adhere to them. A boy should be set on guard over the Pea plot till the plants are well above ground, say, six inches tall. If there is no rain, water should be given once in eight days till flowering, once in four days when the pods are forming and swelling, and gradually reduced thereafter. Cut the pods off with scissors.

Firminger states : "It is better to make a trial-sowing a week or so previous, in order to determine how thickly the seeds should be sown, as well as to check dishonesty on the part of the mâlee, who has sometimes a trick of purloining the seeds from the ground after they are sown, and then maintaining that they were too old and bad to germinate.

If in the trial-sowing only a small proportion be found to germinate, it is perhaps the best plan to sow the whole batch in a very light sandy soil in seed-pans, and then transfer to the drills those that prove sound as soon as they have sprouted. This plan it will be found advisable to resort to, more particularly with the wrinkled Marrowfats, which, from their softness and apparent immaturity, often come to this country in a less sound state than other kinds.

If the seeds, however, prove satisfactory, and nearly all good, it may be sown in the drills in a single line.

When the plants are about half a foot high they should be earthed up ; it is then also the best time to stick them before they begin to fall about. The mode of sticking I adopt is to make the sticks of every two rows lean together so as to cross each other at about eight inches from their tops, and to tie them where they cross.

The plants, when they come into bearing, should be copiously watered, in order to keep the Pea tender, and to prevent it from ripening too soon.

To gather the pods when ready, the mâlee should be furnished with a pair of scissors for cutting them off, and not be allowed to wrench them, as is usually done, from the stems, often causing thereby great damage to the plants.

Sowing for succession should be made at intervals of about a month, but in Bengal not later than the middle of December,

There is perhaps no vegetable that deteriorates less from sowing seed saved in the country, year after year, than the Pea. Any one, therefore, who has once received a good supply of seed, particularly in Upper India, whither the expense of carriage of imported seed is very great, need require no fresh supply from Europe for many years, if he ever does at all. The seeds saved, however, must be the best produce the plants yield, and not the mere refuse, left after numerous gatherings for the table. An especial crop should be grown for the sole purpose of saving seed from".

Improved English varieties of Peas do fairly well on the hills in the south of India, but throughout the Deccan, and on the plains generally, they are always attacked by mildew when the pods are being formed.

For this reason acclimatised seeds of good quality, which are immune to the disease, are preferred to imported varieties.

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At Bangalore, sowings put down with the first burst of the south-west monsoon are the most productive.

The seed, when well dried, should be stored in bottles and carefully corked, as there is a species of small beetle which preys upon them, and which would otherwise enter and destroy the whole stock.

On the hills begin sowing early in March in a sheltered situation at first. Successive sowings can be made up to September every 15 days.

CANAVALIA ENSIFORMIS.

Sword Bean, Mukhun Seem.

A native vegetable : the pod is large, flat, sword-shaped, fully nine inches long, and more than an inch and-a-quarter wide ; though rather coarse-looking, when sliced and boiled, is exceedingly tender, and thoroughly deserving of cultivation in the garden.

The plant is a perennial, and a most extensive climber, bearing year after year, from the middle of the rains, throughout the cold season, an abundant crop.

The seed is sown from mid-April to end of June, three inches deep, one foot apart, and in rows five feet asunder. The plants need strong supports and hoeing. Water should be given once in 10 days in the dry weather.

Roxburgh describes three varieties thus :—

"*a.* Erythrosperma : flowers and seeds red.

"*B.* Erythrosperma : flowers white and seeds red.

"*y.* Leucosperma : flowers and large seeds white. Pods about two feet long ; often 20-seeded. This variety is considered the most wholesome of them all, and is extensively used at the tables of Europeans, as well as by the natives of Sylhet, where it is indigenous."

MUCUNA NIVEA.

Khamach.

A very excellent native vegetable.

Roxburgh says : "By removing the exterior velvety skin of the large flesh tender pods, they are, when dressed, a most excellent vegetable for the table, and the full-grown Beans are scarcely inferior to the large Garden Beans of Europe." Firminger considered that the Beans seemed to partake rather of the agreeable flavour of the Lima Bean, and afforded a very nice dish during the latter end of the rainy season.

The seeds should be sown from mid-April to mid-June, six inches apart in rows six feet apart, and the plants, being supplied with some kind of support to climb upon, demand no further care in their cultivation.

Not cultivated in hill gardens.

DOLICHOS LABLAB

A native vegetable : the pod is a broad, flat kind of French Bean, and is dressed and cooked in the manner of French Beans.

Four eatable varieties, met with for sale in the bazars during the cold season, are thus described by Roxburgh :—

"*a.* Albiflorum : *Shwet-seem* : flowers white, smallish ; cultivated in gardens, and supported by poles, often forming arbours about the doors of the poor natives. The tender pods eaten like French Beans. The plant has no disagreeable smell.

"*B.* Rubiflorum : *Jeea-seem* : flowers red ; cultivated like the last and much esteemed by the natives.

"*y.* Purpurescens : *Goordal-seem* : flowers large, purplish. A large variety ; cultivated like the last. Legumes broader, with the seeds more remote than any of the other varieties.

"*d.* Purpureum : *Rukto-seem* : stem and the large flowers purple· Pods deep purple."

Seeds are sown in well manured soil, eigt inches apart, in rows five feet apart and staked up. Sowings are made during May and June. Flowers and fruits begin to appear toward the end of the rains.

LABLAB CULTRATUM.

A native vegetable of the same character as the last, of which the following description is given by Roxburgh :—

"All the varieties of this species are cultivated during the cold season in the gardens and about the doors of the natives, forming not only cool shady arbours, but furnishing them with an excellent pulse for their curries, etc., in their tender pods. In short, these and their varieties of *L. vulgare* may be called the *Kidney Beans* of *the Asiatic*.

"*a.* Rectum: *Panch-seem*: pods straight; seeds reddish; flowers white, large.

"*B.* Falcatum minus :*Baghonuko-seem* : pods falcate, size of the little finger; flowers white, largish.

"*y.* Falcatum majus : *Dood-pituli-seem* : pods falcate, much longer than in *B*; flowers purple.

"*d.* Gladiatum, flore albo : *Sada-jamai-pali-seem* : pods gladiate-clavate, length of the little finger; flowers white.

"E. Gladiatum, flore purpureo : *Pituli-jamai-puli-seem ;* pods as in *y*; flowers reddish purple.

"*0*. Macrocarpum: *Gychi-seem,* the largest of all: pods six to eight inches long; seeds black, with a white eye; flowers red."

Not cultivated in the hills. Sow in June on the plains.

PSOPHOCARPUS TETRAGONOLOBUS.

GOA-BEAN—CHEVAUX-DE-FRISE BEAN.

Chari-koni-Seem.

A native vegetable: bears a curious four-sided pod, six or eight inches long and half an inch wide, with a leafy kind of fringe running along the length of its four corners. The pod is cooked whole, in the manner of French Beans, to which it is far inferior in flavour.

Though as a vegetable of little value, the plant is well worth a place in the garden, being ornamental for the large blue flowers it bears in the cold season, as well as for the effect of its curious pods hanging upon it. The seed is sown in the rains and the vegetable succeeds best in the hot weather if slightly shaded by a grass roof supported on short upright posts. The plant needs support if it is to grow to its best.

Not met with in the hills.

VICIA FABA.

BROAD BEAN.

Seem.

Of this vegetable, which possesses in India little of that peculiar flavour for which it is esteemed in Europe, there are three principal varieties: the Wax Pod, the Long Pod, and the Windsor.

Sowings should be made about the middle of October. The seed should first be immersed in a basin of tepid water, and be allowed to steep twelve hours or more. Unless this mode of softening their rinds be adopted they will remain a long time in the ground before germinating, or if the ground be dry, will fail of germinating altogether.

The seeds are to be put in the ground two inches deep, in rows of double drills one foot apart, with a space of three feet between each row of double drills. When the plants come into full blossom, about an inch should be nipped off from the top of each. This will prevent the formation of more blossoms, and cause those already opened to form pods.

On the hills sow in March.

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PHASEOLUS MULTIFLORUS

SCARLET RUNNER.

This is an extensive climber, and bears very large seeds, when ripe of a mottled dark-purple character. In most parts of India it is difficult to cultivate satisfactorily. In the cold weather (if not frosty) it grows well, but sets little fruit and the hot dry months kill it.

The seeds should be sown in October, when the rains are over, in a row, at a distance of three inches apart. Firminger says: "I have sown the seed earlier, and had plants in blossom in the rains. Their old familiar scarlet flowers looked very pretty; but they dropped off without setting a single pod. The plants, when about three inches high, should have sticks put in the ground for their support.

On the hills sow in March. They do well here."

PHASEOLUS VULGARIS.

FRENCH OR KIDNEY BEANS.

1. CLIMBING.—Climbing French Beans are as prolific as the Dwarf kinds; and have a longer season.

The Dutch, bearing small ivory-like seeds, next to the Dwarf kind proved with Firminger the most productive. The plant is of slender habit, does not grow high, and bears long, narrow, very delicate pods.

The seed should be sown in October, in a row, about three inches apart. Firminger had the plants in blossom in the rains, but found them utterly unproductive at that season.

2. DWARFS.—Of the Dwarf kinds of French Beans, as those are called which require no sticks for their support, there are a great many named varieties.

The first sowing may be made about the beginning of October in a good soil. The seeds should be put in two inches apart, about an inch deep, in rows, two feet between each row.

The seed, if sound, will germinate in three or four days; and the plants will come into full bearing in about six weeks from the time of sowing. As the crops are of short continuance, sowings should be made in succession at intervals of about ten days to keep up a constant supply.

Firminger found that Dwarf French Beans did not thrive well except in a situation considerably shaded. Where much exposed to the sun the plants not only made slow growth, but were apt to have their leaves prayed upon and much injured by insects; they then became entirely unproductive.

On the hills, sow from March to June. The same cultivation will apply as for the plains.

In the south, sowings that accompany the early rains (May and June) are invariably the best. In dry weather, irrigate once in four days.

PHASEOLUS LUNATUS.

LIMA BEAN

This Bean is widely cultivated in Burma, but is not so popular in India. The seeds of certain types contain a prussic-acid-forming glucoside. The white types are less dangerous. Seeds are usually boiled or parched, hence few fatalities result from the use of the beans.

The plant is a climbing one and may be sown mixed with other crops which support it, *e.g.*, castor or maize. When cultivated by itself, the seeds are sown six inches apart in rows three feet apart. The sowing time may extend from June to December according to rainfall and climate generally. The crop is ready in about seven months. Supports of sticks are necessary if a support crop is not grown.

MORINGACEÆ.

MORINGA PTERYGOSPERMA.

HORSE-RADISH TREE.

Suhujna—Nugge.

The root of this tree is generally used throughout India as a substitute for Horse-radish, to which, however, in flavour it is much inferior. Plants are usually raised from seed, and are of exceedingly rapid growth. The long unripe seed-pods (familiarly known as the "Drumstick") are greatly consumed by Indians in their curries. When cut into pieces about four inches long and boiled, the pods have a most agreeable flovour, hardly to be distinguished from that of Asparagus, and would be an excellent vegetable for the table, were they not of so fibrous a nature. They are produced in the month of March. Sow the seed in June and July.

MALVACEÆ.

HIBISCUS ESCULENTUS.

OCHRO—OKRA—GOBBO—LADY'S FINGERS.

Dhenroos—Ram-Tarooee—Bhindee.

This vegetable, so common in all parts of India, grows to about two or three feet high, and is familiar to most persons from the large, handsome yellow flower it bears. The erect hornlike half-ripe pods, when cooked for the table, are of an agreeable flavour, and may be used for thickening soups and gravies. The mucilage contained in the pods may, however, be in a great measure removed by cutting them into small pieces, and frying them, instead of boiling them only, as is more commonly done.

They are valuable, moreover, for affording a dish at the close of the rains, a season when frequently Potatoes and other vegetables are scarcely to be had.

The seed may be sown at any time during the rains, and the plants put out at two feet apart each way. Any ordinary garden-soil suit them.

Cultivated throughout the Deccan and Carnatic ascending to about 4,000 feet. It suffers a good deal from insect pests, including the spotted cotton boll-worm. Removal of infected fruits and keeping the land in a fine mulch are measures that help to reduce attack.

CRUCIFERÆ.

NASTURTIUM OFFICINALE.

WATERCRESS.

Watercress thrives well in all parts of the country, and abundance of it may be easily raised in the cold season for salad. The plants are propagated from seed or cuttings in October. In gardens where there is a tank, the best plan, perhaps, is to sow the seed or plant the cuttings in rather shallow pans with a few small holes in their bottom, and half filled with soil. Place the pans along the edge of the tank, so that the bottoms may be immersed; the water, penetrating through the holes, will keep the roots of the cress continually wet. As the water sinks in the tank, which it will gradually do during the cold season, lower at the same time the pans into it. Ordinary beds kept flooded will yield good crops in the cold season.

Sow from March to May on the hills.

COCHLEARIA ARMORACIA.

HORSE-RADISH.

Horse-radish has been now for some years grown, but can hardly be said to have been cultivated in India. As exhibited at the Calcutta annual vegetable shows, it is always in the condition of a number of fibrous roots of different degrees of thickness, twisted in every kind of crooked form, instead of being, as it ought to be, one single straight stout stick.

The mode of cultivation adopted in England is to bury pieces of the root, an inch and a half long and a foot deep in the ground,

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which, by a year or two after, will grow up and reach the surface and then be fit for taking up for use. This method will apply on the hills ; but on the plains Firminger was not successful with it as the pieces of root he deposited below the ground in a very short time perished.

The plan he then resorted to, with perfect success, was as follows:—

Place round the sides of a flower-pot, filled with mould, well lightened with silver-sand, pieces of the roots, of the thickness of a quill, and two inches long. These being kept watered, quickly sprout and form rooted plants. Dig holes a foot and a half deep, ten inches wide and a foot apart, on a piece of high ground. Fill the lower half foot with well manured soil, and the remaining upper foot with a light mellow soil, and put one of the plants in each. When they have been established about a week or two, remove the earth from the roots, and clear away all the small fibrous roots that have formed, leaving only one main root to proceed downwards. Repeat this three or four times at intervals, removing the earth deeper each time for the purpose. When the main root has descended about a foot deep, which it will do in a very short time, by being cleared of all fibres upon it but those at its very extremity, it will have reached the rich soil at the bottom of the hole. Remove then the uppermost foot of soil, and fill in with silver-sand. This answers two purposes. The water given to the plants will immediately sink down through the sand to the roots, where it is alone wanted ; and the main axis of the root will not be induced to form fibres on its sides. The roots will be ready for use in about four or five months' time.

This plan may seem troublesome, but it is not very much so in reality. The horse-radish, however, may be grown like any other ordinary plant, by merely putting out the plants in a good soil, on a high piece of ground, at the distance of a foot or more apart. It can only be grown at hill stations in the south. The scraped root of *Moringa pterygosperma* is not a bad substitute for the real horse-radish.

LEPIDIUM SATIVUM.

CRESS.

Hâleem.

Cress-seed may be sown in the open ground when the rains cease in October. It is best to sow only a small quantity at a time, and to keep up a succession of sowings, at short intervals, during the cold season. As the mâlees rarely cut it for use till it is three or four inches high, it is as well to sow it broadcast, and rather thinly.

If, however, it be required to be eaten, as is usual in England, when little more than the seed-leaves are formed, it may be raised at nearly all times in the year. It is best in that case to make the sowings in large shallow pans, filled with good light soil. The soil should be well watered, and the seed then scattered thickly over its surface. Over the pan a covering should be placed till the seeds germinate, and then be removed. In a few days the cress will be fit for cutting.

In order to save seed, in the early part of the cold season, plants in the open ground at about six inches apart should be reserved. These, by the commencement of the hot season, will yield a plentiful supply of seed, which should be carefully stored away for future use.

Sow the seed from March to June on the hills. It requires no further care beyond watering regularly.

BRASSICA OLERACEA.

CABBAGE.

Kobee.

Of all vegetables this is probably the most useful, being comparatively easy to grow, and giving a large amount of that succulent green matter so essential in diet in the tropics. There are numerous varieties. Since Firminger's time the popular varieties have changed, and in this, as in all cases of choice of a variety, the seedsman is the best adviser. For Cabbages the soil can hardly be too rich. The land should be covered to a depth of four inches with well-rotten farmyard manure, which should be thoroughly forked into the soil. Cabbage should not be grown for two successive reasons on the same ground. Seed is sown in seed-pans or a seed-bed towards the end of the rains and sowing may be continued for two months to get successive crops. When the seedlings are four inches high transplant to the field in rows two feet apart, and two feet apart between plants. Irrigate once in four days and keep the soil well hoed. The crop is ready in about four months.

When a head of Cabbage has been cut, if the stump be left in the ground, it will send out side shoots and produce two or three nice heads, little inferior to the one that was cut.

When the hot season, moreover, approaches, and the Cabbages no longer form heads, young sprouts will be produced from the old stalks affording a nice supply of greens for the table till a very late period.

A red variety is grown for pickling. Its cultivation is the same as that just described for the green varieties.

On the hills begin sowing the seed about the middle of February, under glass and in pans or pots, with bottom heat. Put out the

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seedlings, when well established, about the third week in March. Successive sowings can be made up to July. After March the seed may be sown in the open. A good, rich soil is indispensable.

Cabbages cut for cooking when little more than half-grown, and before they have begun to form a head, are usually called "Greens."

In this country, in the way of Greens nothing can equal Cauliflower-plants, cut when not quite half-grown, for flovour and delicacy.

BRUSSELS SPROUTS.

A variety of *Brassica oleracea* which, instead of forming one single head, produces numerous small ones, of about the size of a pullet's egg, is known by the above name. It is in season in Europe during the hard weather, when other vegetables of the sort are unattainable, and is accounted then a great delicacy.

Sow in September and October. On the hills sow in March and April. The seedlings should be transplanted to the field, fifteen inches apart in rows two feet apart. Soil treatment and watering as for Cabbage.

BORECOLE—SCOTCH KALE.

A variety of Cabbage remarkable for its crimped and plume-like leaves, which spread abroad loosely, and never form, as other kinds do, a compact head. Its principal merit in Europe consists in its great hardihood. In this country, there can be no reason for cultivating it on that account. It has consequently little to recommend it, but its curious and ornamental appearance. The time and manner of cultivation are the same as for any other kind of Cabbage.

For the hills, the remarks on Cabbage apply to this.

CAULIFLOWER.

Phool-Kobee.

This is a variety of *Brassica oleracea* in which the dense white flower heads are eaten. The land for this vegetable requires heavy manuring and thorough working as for Cabbage. One ounce of seed is enough for fifty square feet of seed-bed, and gives enough plants for one acre of garden. Sowings should be made once a fortnight during August, September, and October. Prick out to three inches apart, and finally transplant to lines two and-a-half feet apart with two feet between the lines. Plant on edge of ridges and water between the ridges as for Cabbages.

The cultivation on the hills is presisely similar to that of the Cabbage, and the directions for it will apply to Cauliflower.

SPROUTING-BROCCOLI

A variety which, instead of forming one large single head, produces numerous small ones on the axils of the leaves. Its principal merit in Europe consists in its supplying an excellent dish at a period of the year when no other variety of Broccoli or Cauliflower is to be had. It is, however, an inferior vegetable and possesses no particular merit to recommend its cultivation in this country.

Firminger made attempts to cultivate it, but with no success.

BROCCOLI.

Of this vegetable there are several varieties mentioned in the English seedsmen's lists. The cultivation of Broccoli and Cauliflower is in every respect essentially the same, and carried on at precisely the same season.

On the hills sow from February to September.

KNOL-KOHL—KOHL-RABI—TURNIP-ROOTED CABBAGE.

This is still another from of *Brassica oleracea* in which the swollen succulent stems are eaten. Green and purple varieties, differing little in quality, are cultivated.

For the manner of cultivation the same directions apply in every respect as for the Cabbage, except that the plants, not requiring so much room, may be put out somewhat nearer to one another.

Knol-kohl takes about six weeks or two months to arrive at a state fit for the table, and is always most acceptable, as being the earliest European vegetable of the season. If allowed to grow to a great size, it becomes hard, woody, and strong in flavour. It is in its best condition when about the size of a large orange. The upper half of the vegetable is always the most tender.

On the hills the cultivation recommended for Cabbage will apply to this.

BRASSICA RAPA.

TURNIP

Selgum.

There are several varieties of the Turnip, both of the white and of the yellow. Remarkably fine specimens of many of these are raised in this country in Upper India, but they mostly have a strong and rather acrid flavour in Lower Bengal and Calcutta, rendering them far from agreeable. For cultivation, therefore, the earliest sorts would be the most desirable, being quickest in growth and of mildest flavour. Good acclimatised varieties are preferable to the imported ones. The latter, in addition to being difficult to grow, are very subject to the attacks of several kinds of grub. The turnip is essentially a cold weather crop.

The time to commence sowing the seed is about the middle of October. The sowing may be made broadcast ; and in order that it may be done evenly, which is of great importance, the seed should be mixed with about four times its bulk of dry silver-sand. But the better plan, perhaps, is to sow it in drills, about a foot apart, and then at the very earliest stage of their growth to hoe out the seedlings to the distance of a foot from each other. Nothing can be more injurious to the plants than to allow them to be in the least crowded, for in that case they expend themselves in leaves, without forming the swollen edible part.

The soil, which before the sowing should be well dug up, ought to be of a light quality, but not recently manured. The plants require to be abundantly watered to promote rapid growth.

On the hills sow from March to September.

SINAPIS ALBA.

MUSTARD.

Râee.

Scarcely any directions can be required for the cultivation of Mustard. The seed, sown broadcast, and very thickly in a small piece of ground at any time in the cold season, beginning from October, will be up in two or three days, and shortly afterwards supply cuttings for a salad. To secure seed, a few plants raised at the commencement of the cold season should be allowed to remain. These will afford an abundant crop of seed just as the hot weather sets in.

On the hills sow from February to September.

CRAMBE MARITIMA.

SEAKALE.

This vegetable is not cultivated with success on the plains of India. The seed is very small, and contained in a seed-vessel of the size of a Pea, of a hard horny nature, which takes a month or more to lie in the ground and soften before the seed can sprout. Firminger raised plants from seed sown in October. They put forth a few thick leathery leaves, but though apparently healthy and vigorous, made little growth, and soon perished after the commencement of the hot season.

On the hills sow from February to September.

RAPHANUS SATIVUS.

RADISH.

Moolee.

There are three principal kinds of Radish, the long-rooted, oval-rooted, and the turnip-rooted. The first is, perhaps, the most tender and delicate, but the last require least care in cultivation.

Radishes raised from seed sown much before the middle of October will generally be found tough, acrid, and hardly eatable. It is little better than wasting the seed to commence sowing earlier.

The soil, if of a close nature, will be the better for being lightened with wood-ashes. It should not have been recently manured. A partially-shaded situation is the best.

The sowing may be made broadcast, which is least troublesome; but the way recommended by English gardeners, and the more economical one, is to sow in drills. The drills should be in rows, three or four inches apart, and the seed should be buried in them a quarter of an inch deep. After the sowing the ground should be well trodden down, or the Radishes will not be well formed. When up, the young plants may be thinned out to three or four inches apart.

The seed usually germinates in three days, and the Radishes are ready for pulling in somewhat less than a month afterwards. Consequently, repeated sowings for succession crops had better be made at intervals of ten days or a fortnight between.

"The turnip-rooted," Captain Weston states, "transplant very well if taken up young, and give much finer Radishes than the seed-bed, being larger, milder, and more crisp."

Radishes require to be well watered during growth, and the soil upon becoming at all dry and caked should be hoed. There is a description of Radish, apparently indigenous to this country, produced sometimes of an enormous size, and much consumed by Indians in the Upper Provinces during the cold weather. It is extremely mild and tender, but totally devoid of the fine flavour for which the best European kinds are distinguished.

Raphanus caudatus: Rat-tailed Radish is a singular vegetable that has lately come into cultivation, and is remarkable for the strange-shaped pods it bears, which soon reach a length of as much as three feet. The plants, when up, will need to be thinned out to about a foot and-a-half from each other.

On the hills, successive sowings may be made every 15 days from March to September.

PART III.

THE FRUIT GARDEN.

PART III.

THE

FRUIT GARDEN.

INTRODUCTION.

THE cultivation of fruit trees is, perhaps, the most fascinating part of horticulture. The final product is so delicious, and there is such opportunity for science and skill in the development of that product. In India, however, fruit-growing is in a backward condition. There are fruit gardens everywhere, but few are well kept. The rich man plants specimens of all kinds of fruit trees and leaves their care to an untrained coolie. The middle-class man sticks in trees and leaves them to Providence ; and the cultivator who earns a living from his fruit trees adheres to ancient varieties and to ancient methods of culture, pruning, and irrigation. In no department of horticulture is there such a chance of genuine improvement as in fruit culture, and we propose to give a few directions regarding successful fruit growing.

The fact that a man may not be long in a station should not deter him from growing some of the more rapidly yielding fruit trees and shrubs, *e.g.*, banana, papaya, guava, cape gooseberry, and fig.

In choosing a site for a fruit garden, whether by itself or as a part of a bungalow garden, three things should be considered, *viz.* (1) soil, (2) water, (3) protection. The soil must be at least three feet deep with a drainable subsoil. If the subsoil is hard rock or stiff clay or if the soil itself is heavy and clayey, give up the idea of growing fruit. Well or canal irrigation is esential. The trees must be in the ground all the year, and for several years, and need a good water supply. Trees must be protected from winds and from thieves, hence wind breaks and hedges are necessary. Assuming that the soil is good, water is available, and protection is arranged, the next and most essential thing is to get the soil into condition. It is well worth while losing a year to get the soil into condition. The succeeding growth and bearing of the trees will compensate for that loss, while trees put into an unprepared soil are a prepetual eyesore. Soil operations should be begun any time before the rains—let us say in January of the present year. The soil should be deeply ploughed and left rough to the action of the elements. After the

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clods have crumbled under the influence of the sun, plough again at right angles, and harrow twice. Then just as the rains break sow *san* hemp (*Crotolaria juncea*) at the rate of 40 lbs. seed per acre. This will come up vigorously with the rains. After six weeks cut it down and plough it in, *in situ*, let it rot well and harrow again. At the end of the rains dig the pits for the fruit trees and between them put in a crop of a deep rooting legume to break up the subsoil—a short season groundnut, such as the small Japanese, is admirable. Harvest the nuts of this and return the roots and stems to the soil. Harrow again. Then transplant the fruit trees into position in the end of January one year after the start of soil operations.

Some prefer to do their planting when the rains break, but, if irrigation water is available, and in districts where there is no danger of frost, January is an excellent month. The trees get established before the heat. The heat stimulates growth. By the time the rains come, the tree is well able to make use of the water, and also well able to stand the check that comes when the soil is waterlogged. A tree planted when the rains break is not in a position to make much use of the early rains, and feels the check of waterlogging severely.

The trees to be grown are determined by soil, climate, and water facilities. Pomegranate, guava, and fig get along on shallow soils. Papaya and banana need good soils and plenty of water. The mango must have a deep soil. Orange and other citrus trees need at least 4 feet of good soil but vary as to water requirements. The vine must have a rich, well drained soil and a very dry ripening season. The apple, peach, pear and plum will not tolerate continuous heat, wet or dry, and must have a winter rest. Hence they are found near the northern frontier or on elevations. There is little difficulty in getting an idea as to what will grow. The question is how to grow it.

It may be laid down as a truism that the main faults of Indian fruit gardening are (1) close planting, (2) overwatering, (3) lack of drainage, (4) omission to work the soil, (5) insufficient and ill balanced manuring. The following are correct distances for the chief fruit trees in India:—

	Feet apart.		Feet apart.
Mango	30	Oranges	20
Papayas	10	Vines	10
Small sour limes	15	Guavas	20
Bananas	12	Pomegranates	15
Apples	20	Peaches	20
Plums	15	Cherries	18
Apricots	20	Figs	15

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Irrigation water is usually given in India in earth basins round the trunk of the tree. This is desirable at no stage of growth as collar-rot may be induced, and it is frankly absurd when the feeding roots have gone far beyond the narrow bounds of the basin. Irrigation in long narrow beds is best in practice, providing ample water for all roots and leaving a space of soil unirrigated through which air may reach the roots also. When the trees are young, one such basin may run on either side of each row and when old, a somewhat broader basin will serve two adjacent rows. It is desirable, however, once every two years to exchange the sites of the basin and the non-irrigated part, so that the irrigated soil does not get packed. Drainage is the removal of surplus water and is the complement of scientific irrigation. To prevent such water standing on the surface, shallow trenches (surface drains) should be run down the slope, one at every 30 feet apart. These must end in a catchment pit where the earth washed away may be deposited. In the rains, the soil between the trees should always bear a cover crop to prevent undue wash, to keep down weeds, and to be used as green manure. Underground drainage is needed in heavy clay soils. It has been little done in India as yet. The simplest subsoil drains are trenches 3 feet deep and 1½ feet across. These may be left open, or the bottom 1 foot may be filled with loose stones and the top covered over with earth, or a tile drain may be laid in the trenches. Each drain must have a slight slope to make water run in it and an outfall into a nullah or catchment pit.

Omission to work the soil means, first, bad soil aeration ; second, robbing of the soil of good materials by weeds ; third, interference of these weeds with the fruit tree roots. The soil, therefore, must be kept well hoed, except when a cover crop is on it. Cover crops *must* be sown thickly to be of any use. Manuring is necessary for fruit trees, but it must be the right manure and it must be applied in the right way. Green manuring in the rains should be a regular operation in a fruit garden throughout its life.

The following general manure is, in addition, of considerable value:—At time of planting, in the pit for each tree, mixed with the earth, put 15 lbs. farmyard manure, 5 lbs. bone meal, and 7 lbs. wood ashes. Each year afterwards, increase the farmyard manure 5 lbs., the bone meal 5 oz. and the ashes 1 lb. per tree, up till and including the fifth year, and apply this amount afterwards. Apply the manures before the rains in the irrigation beds and mix well with the earth. In soils lacking lime apply 8 oz. slaked lime per tree per annum with the manure. This is, of course, merely a simple scheme of manuring for general fruit cultivation.

With these preliminary remarks we may now proceed to study the fruit trees themselves.

CSL

PALMACEÆ.

BORASSUS FLABELLIFORMIS.

PALMYRA-TREE—FAN-PALM.

Tâl gachh.

The Palm is well known. It produces in the cold season a crop of great round black fruits. The interior of each fruit consists of an insipid, gelatinous, pellucid kind of pulp, about the size of a child's head. A good preserve, it is said, may be made of it, and when of about the size of a fowl's egg it is often used for pickling.

The undeveloped seed kernel is the most delicious part of it, and as it is sold in large quantities in the bazars during the hot, dry months of April and May, it is most acceptable, being very refreshing and cool.

COCOS NUCIFERA.

COCONUT.

Narial—Khopra.

The ideal conditions for the coconut are (1) proximity to the sea, (2) a temperature ranging between 55° and 90° F., (3) rich but very porous and friable soil, (4) a rainfall of 50—80 inches, well distributed. Coconuts, however, can be grown at considerable distances from the sea and, under artificial irrigation, in regions of low rainfall. They must always have a light rich soil, however, and will not tolerate great extremes of temperature.

Coconuts are propagated by their nuts. For seed purposes nuts should be selected from trees of good growth and producing nuts of desirable size and quality. The nuts should be gathered when half full of "milk" and placed in a nursery to germinate. It is a common and reprehensible native practice to let the nuts steep in a well till they germinate. The seed nuts should be laid 1 foot apart each way under half shade in well cultivated and enriched soil, and almost covered with the soil. The nuts should be watered every second day if there is no rain, and the seedlings with nuts attached transplanted in pits 25 feet apart each way in the field when from 6 to 12 months old.

Coconut trees are usually planted much closer than this to their great detriment. While the coconut trees are making their growth there is no objection to taking other crops off the land such as papayas, guavas, bananas, vegetables, groundnuts, etc. Trees come into bearing from the fifth to the eighth year and go on bearing up till the fiftieth. Yearly green manuring is necessary. Fish manure is usually easily available near the coast and 15 lbs. of this per tree should also be given annually. Each tree yields from 20—50 nuts per year. The coconut palm has two serious insect enemies, namely, the rhinoceros beetle (*Oryctes rhinoceros*) and the palm weevil (*Rhynchophorus ferrugineus*). These are very different in appearance and have different modes of action. The rhinoceros beetle, a huge black insect with a horn on its head, bores its way rapidly into the soft young trunk near the leaf bases and goes downward into the stem. It can sometimes be reached by a wire, but the best method is to pour a little tar or turpentine down the hole and stop it up with clay. The beetle lays its eggs in rotting material, especially dung, and hence such material must not lie about the plantation. The palm weevil, on the other hand, lays its eggs on the soft parts of the top of the tree and in tree wounds. The larva that hatches out is a footless worm which bores into the tree and grows to an enormous size. As many as one hundred of these loathsome larvæ have been recovered from one tree-top. A tree really attacked by these larvæ is hopeless, and must be cut down and burned. The weevil itself, the actual insect, may be trapped at night by suspending a lamp over a basin containing fermenting coconut milk. The insects fall into the liquid and are drowned. For the rhinoceros beetle some authorities recommend the strewing of sharp sand among the leaf bases. This sand gets into the wings and leg joints of the beetles boring there, and kills them.

A disease known as *bud rot*, due in India to the fungus *Pythium* followed by bacteria, is prevalent in some places. Spraying of the tree-top with Bordeaux mixture controls this disease. The spray is applied from an automatic (pressure) sprayer carried on the back of a climber. There are other fungoid diseases of less importance for which no definite remedies are yet known.

PHŒNIX DACTYLIFERA.

DATE-PALM.

Khajoor.

The conditions limiting the cultivation of the edible Date-palm are those of climate. In most parts of India the heavy monsoon rains come when the Date flowers and fruits, and so either prevent pollination or damage the fruits. In areas where the rainfall during the flowering and fruiting season, March to November, does not exceed five inches and where frost is not severe or prolonged, Dates may be grown on almost any soil. Irrigation is, of course, necessary. The plant is best propagated by offshoots from trees of good quality. These are severed from the parent when from 3 to 6 years old and the large leaves cut off. They are planted out 25 feet apart each way, and come into bearing about 8 years from planting. The Datepalms are male and female, and 4 male trees per 100 females should be planted. The pollen of the male flowers is artificially dusted over the female inflorescences and a good yield thus ensured. Offshoots from a male tree give only male trees and from a female tree only females.

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BROMELIACEÆ.

ANANASSA SATIVA.

PINE-APPLE.

Ananâs.

The best conditions for Pine-apple cultivation are low elevation and moist hot climate. Nevertheless the fruit can be grown in a great many places even up to 5,000 feet, provided that there is sufficient moist heat. Great variations of temperature and humidity are inimical to the plant. Excessive shade damages the plants, but light shade is beneficial. In Eastern and Northern Bengal, Assam, Burma, and Ceylon they grow well. There are some fair plantations in Gujarat. The varieties of this plant are numerous. Firminger mentions the following:—

"1. The Bengal kind is not by any means an indifferent fruit when grown in a situation exposed to the sun. The large insipid fruits sold in such quantities in the bazars are nearly all produced under the shade of trees, in out-of-the-way places, the shade conducing as much perhaps to the size as it tends to detract from the flavour. The following are the varieties issued from the Gardens of the Agri-Horticultural Society :—

2. The *Ceylon*, introduced originally by Mr. Robinson, is decided to be the finest in flavour of all. The fruit is rather large greenish when young, and of an orange colour when ripe.

3. The *Sylhet*, or *Koomlah*, is a small fruit, compact in form, of very high reputation ; when young of a black colour, and bright yellow when ripe. It is peculiar, too, for the very large size of its eyes, and for not having more than seven or eight of them.

4. The *Dacca* : also a fine fruit, remarkable for the smoothness of its rind and white colour of its eyes.

5. The *Penang* : one or two sorts introduced from Penang differ but little from the ordinary Bengal kind.

6. *Conical-crown* : a variety of curious long sugar-loaf form, but of no particular excellence.

7. *Striatifolia* : a variety, I believe, from Java. With its merits I am unacquainted, as it is unproductive here. The beauty of its leaves ; striped with red and white, seems to be its principal recommendation.

8. *Cayenne* : a variety much cultivated in Europe, where it is in high estimation, and where it is accounted the best kind for winter fruiting. There are two sub-varieties, the Smooth and the Prickly. The one we have was introduced in 1860 from Peradeniya in Ceylon ; is remarkable for the deep verdant green of its leaves, and for their

being almost entirely divested of spines. It has not fruited here yet.

9. *Moscow*; 10. *Queen*: Mr. L. Berkeley informed me that he had imported these two varieties from Europe, and that the former had fruited in his glass-house at Lahore."

Red Ripley, Green Ripley and Smooth Cayenne are under cultivation at Bangalore. The Kew Pine is also cultivated in Mysore.

The Giant Kew is apparently the same as or similar to the Smooth Cayenne, and has long broad leaves, without spines on the edge; fruit yellowish green, cylindrical; bracts reddish. The Queen has leaves of a bluish green, with widely apart marginal spines; fruits yellowish and oval.

The Pine-apple flowers in February and March, and ripens its fruit in July and August. After which, in September and October, it makes its principal growth. It sometimes, however, happens that plants, instead of making growth then, break into flower, and so produce fruit in the cold months. This is by no means desirable, as the fruit produced thus unseasonably is, from want of heat sufficient to ripen it, almost invariably, acid and uneatable. Young shoots and suckers not required should be removed from the plants as soon as they make their appearance.

After the rains, no water need be given them till they have set their fruit in February and March, when, as well as during all the time that the fruit is swelling, it should be bestowed abundantly. Occasional sprayings with water during this period are beneficial.

The proper season for planting out Pine-apples, as will be easily understood from the above, is in August. A situation should be chosen for them where they may be fully exposed to the sun. They should be placed in rows, at a distance of three feet at least between each row, and at a distance of two feet from each other in the row.

The parts used for propagation are the suckers that spring from the base of the plant. Suitable soils are those containing sand, clay, and a fair amount of humus. Heavy sodden clay soils must be avoided. The plants are put in place on ridges. The site of the plantation must be changed every second or third crop and heavy dressings of farmyard manure given. The crop is ready in about 12 months from planting.

SCITAMINEÆ.

MUSA.

PLANTAIN—BANANA.

Kêla—Bale.

In the West Indies the term *Banana* is appliled to varieties whose fruits can be eaten raw, and the term *Plantain* to varieties whose fruits require cooking. In India, the term Plantain is applied indiscriminately to all varieties. There is also some confusion regarding the scientific name of the species of which the various kinds of Banana and Plantain are varieties, but to avoid argument, we shall term it *Musa sapientum*, the earliest name given by Linnæus. Similarly we shall use the term Banana as the English equivalent of this specific name. The cultivated Banana varieties are generally seedless, but occasionally one comes across a few seeds in an edible fruit, and such seeds may grow if sown.

The Banana grows best on moist soils. It delights in the climate of the coast, but will grow whenever it can get plenty of water and where it is protected from hot drying winds. It is propagated by suckers springing from the underground bulb or corm of an older plant. Of these there are two types the sword suckers, with narrow leaves, and the broad-leaved suckers. The first-named give the best plants. The ground for Bananas must be well tilled and the suckers planted 12 feet apart each way. The banana is a gross feeder and needs liberal manuring, best given in three doses, one month, two months, and three months after planting. Castor cake 10 lbs. plus fish 15 lbs. per tree is an excellent manure. Castor cake 4 lbs., sulphate of ammonia 1 lb., sulphate of potash 4/5 lb. and calcium superphosphate 7/8 lb. has proved useful. Green manuring is desirable once a year and the soil must be kept well hoed. The first crop comes in 10—12 months from planting, and is poorer than any succeeding crops. Succeeding crops in well-treated plantations should come on every five months and be twice the weight of the first crop. When a Banana tree has fruited it dies and must be cut out; its suckers replace it. There is an art in regulating these suckers. One should be half grown when the old tree is fruiting and another should be about 2 feet high—others being cut out. A succession of fruiting trees is thus obtained and overcrowding prevented. The number of fruits per tree is greatly increased with good manuring and cultivation, and is decreased by neglect. After five years a Banana plantation should be cut out and the land given to other crops for three years before Bananas are put on it again. The fruit bunch is severed when the fruit is full-grown and is hung up in a dark cool place to ripen. In the ripening process the starch of the fruit changes to sugar, and the proportion of pulp to skin increases. A disease (black rot) due to the fungus, *Glæsporium musarum*, occasionally attacks the fruits both on the tree and in store. It can be prevented by spraying with ammoniacal copper carbonate.

Bananas can be successfully dried, after skinning, by exposing them to the sun on light bamboo trays, covered by glass to keep off flies. This process is repeated for some days. The dried product looks, tastes, and keeps like a well-dried fig.

There are numerous varieties of the Banana of which the following are some :—

Kanarese—

Yelakki bale ..	.. Large fruited Banana.
,, ,, ..	.. Small ,, of same,
Yele bale ..	.. Cultivated for the leaves only.
Gulur bale ..	.. Large, butter Banana.
,, ,, ..	.. Small.
Katte bale ..	.. Cooking Plantain.
Madaranga bale ..	.. ....
Rasa bale ..	.. Dessert Banana.
Havu bale ..	.. Snake Banana.
Gujja bale ..	.. Short Banana.
Putta bale ..	.. Small, elegant Banana.
Chandra bale ..	.. Red Banana.
Jain bale ..	.. Honey Banana.
Raja bale ..	.. Royal Banana,
Pacha bale	Green Banana.

also :—

Marathi—

Lalkel ..	.. Big, red Banana.
Mhaskel or Bankel	.. Deep yellow, angular Banana.
Rajeli ..	.. Pale yellow Banana.
Basrai ..	.. Curved, pale green Banana.
Mutheli ..	.. Dumpy, curved, orange yellow Banana.
Lal Velchi ..	.. Like Mutheli, but not so thick ; flesh creamy.
Safet Velchi ..	.. Like Lal Velchi, but flesh chalky.
Sonkel ..	.. Golden-coloured Banana.

Of this plant the varieties cultivated in the vicinity of Calcutta are given by Firminger as follows:—

"1. *Chumpa* : This, in my estimation, is decidedly the finest of all the Plantains, rivalling in lusciousness and delicacy of flavour the most delicious pear.

The plant is easily recognised by the pervading tinge of red on the stem, and more particularly by the redness of the great central rib of the leaf, both on the upper and under side. The fruit is about six inches long, ripens of a pale straw colour, and is not fit to be eaten till it can be removed from the bunch without the slightest effort.

2. *Cheenee Chumpa*: differs only from the preceding in being a much smaller fruit—not much larger than a man's thumb. It is borne in large, densely compact bunches.

3. *Martaban*: also a very delicious fruit; in flavour considered by some as equal to the Chumpa, which in size and colour it much resembles. The plant is known by the rib of the leaf being devoid of red both above and below, and by its rim, particularly at the base, having a slight border of reddish-brown, which becomes larger and more prominent upon the sharp upper edges of the foot-stalk.

4. *Daccâe*, or *Daccâe-Martaban*: as sometimes called by the natives, possesses a flavour surpassingly rich and luscious, and quite distinct from that of the preceding.

The plant bears a strong resemblance to the Martaban, but is at once distinguished from it by the red border upon the upper edges of the footstalk being three times as broad; as well as, more especially by the large quantity of lime-like powder coating the stem and under side of the leaves. The fruit is about four inches long, and about half as broad as long, with a very thick rind. It ripens to a pale yellow, the tip and stout stalk remaining a bright green. This fruit, unlike the Chumpa, remains firm and tight on the bunch when fully ripe.

5. *Kuntêla*: This is a very inferior fruit, of pithy consistency and insipid flavour, though the one cultivated the most extensively of all, and sold in great quantities in the bazars. The cause of the very great demand there exists for this particular kind among the natives, is on account of its being employed in offerings to Seeva, being the only sort, too, they think right to use for that purpose. The inferiority of its flavour as a fruit moreover, is of little concern to them, as it is principally in its immature state for cooking in curries that this Plantain is consumed. The head of the flowers, likewise, before the sheath in which they are enclosed expands, is often cut off, being esteemed a most delicious vegetable. The plant is distinguished by the pure rich green of the leaves and footstalks, darker than that of the Kutch Kêla. It grows to a great height. The fruit resembles in appearance the Martaban.

6. *Kutch Kêla*: a fruit of great size, used only in its unripe state by the natives for their curries. When boiled it has somewhat of the flavour of the Parsnip, and is a nice vegetable to eat with roast meat. The plant is known by the pervading rich yellowish green of the leaves, being quite devoid of any tinge of red.

7. *Mâhl-bhog* or *Mohun-bhog*, is to my thinking a fruit not much superior to the Kuntêla, which it somewhat resembles, though in very high estimation with some."

MUSA CHINENSIS.

CAVENDISH PLANTAIN.

A very delicious Plantain, of rich and peculiar flavour.

The plant may be recognised in a moment by its dwarf and compact form, not growing to above half the height that other kinds do, and bearing very large, wide, thick, dark-green leaves, which lie closely one upon the other. The fruit is borne in enormous bunches, is about ten inches long, of moderate and uniform thickness, and ripens to a pea-green colour. It is exceedingly difficult to obtain in perfection as it is uneatable till quite ripe, and on its becoming ripe commences almost immediately to decay. Its English name was given it by Sir J. Paxton in honour of the Duke of Devonshire.

MUSA SAPIENTUM, SYN. ARAKANENSIS.

ARRACAN PLANTAIN.

Firminger states: On sending plants of this species to the Agri-Horticultural Society some years ago, Captain Ripley observed: "If well manured the fruit of this tree is one of the best Plantains there is; the old trees yield particularly fine fruit."

Arracan seems to be especially rich in the variety of Plantains it produces, for besides the above, Captain Ripley sent to the Society in September of 1857 as many as eighteen kinds, of eleven of which he wrote in high commendation. But whether from inattention, or from their being unsuited to the climate, Firminger found, on inquiry in 1861, that the whole had perished. Firminger gave the names, with Captain Ripley's remarks, as follows:—

1. *Hpeegyan* has a thick rind of a darkish brown, is a very pleasant fruit, being of a mellow sub-acid flavour.
2. *Thenasia*: a small-sized fruit, but of excellent flavour.
3. *Beela*: a good Plantain.
4. *Nataboo*: this is a very luscious fruit.
5. *Byat Taus*: is a large, well-flavoured fruit.
6. *Gyeeswé*: the Hog-deer's Tooth; is a long, thin Plantain of good flavour.
7. *Moungbya*: is much liked; it has pleasant sub-acid flavour. The skin is of a dead white, and very thick.
8. *Peemwé*: also a sweet, well-flavoured fruit.
9. *Wet Tsway*: the Boar's Tusk. Is an excellent-flavoured handsome fruit.
10. *May dauletthé*: a long narrow Plantain, growing in handsome bunches, with a luscious fruit.
11. *Moungore*: a thick-skinned Plantain of good flavour."

Firminger also mentioned an African Plantain, which he calls *Musa Africana*, with merits of which he said he was unacquainted.

This African Plantain mentioned by Firminger may be the *Makono Tembo* of East Africa, which is probably identical with the Philippine *Tundoc*. It bears fruits weighing 1 lb. each of a fair flavour and pinkish flesh.

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Bananas dried at Agashe in the Bassein Taluka of the Bombay coast, the Rajeli variety being used for this.

CUPULIERÆ.

CORYLUS AVELLANA.

FILBERT.

Neither the Filbert nor any variety of Hazel-nut is to be met with on the plains of India. Numerous attempts have been made to raise plants by sowing the kernels, but have invariably proved unsuccessful. Even if plants could be raised, in all probability they would never be productive, as has been found to be the case in Mauritius. But on the hills the tree is common enough.

CASTANEA CHINENSIS.

CHINESE CHESTNUT.

This tree, Dr. Voigt states, was introduced from China into the Calcutta Botanical Gardens in 1807, but had not flowered up to 1814. In the year 1854 a hundred seedlings were introduced into the Gardens of the Agri-Horticultural Society by Mr. Fortune, who said that the tree produced a nut quite equal if not superior, to the Spanish Chestnut. The climate of Calcutta seemed, however, little suited to them, as they made no growth.

CASTANEA VESCA.

SPANISH CHESTNUT.

This tree will not thrive on the plains of India; but it is very common on the hills of Northern India, *e.g.* Simla Mussoorie, Murree, etc., where it flowers in March and April with its panicles of lavender, coloured blossoms, and sets an abundance of fruit in May and June.

JUGLANDEÆ.

JUGLANS REGIA.

WALNUT.

The walnut-tree is common on the hills of Northern India, and produces there its crops abundantly. No productive tree is met with in the plains. Plants are, however, easily raised from seed; but these, both in the vicinity of Calcutta and in other parts of India, after reaching to a height of about two or three feet, make no further growth, and remain the same for some years, until they ultimately die off.

CARYA OLIVÆFORMIS.

PECCAN NUT.

This has been tried in India without success.

URTICACEÆ

MORUS ALBA.

MULBERRY.

This plant is a small tree indigenous in Northern and Western India, and cultivated in Europe. It is cultivated also in Northern India. The leaves are used for the feeding of silkworms. The fruit is produced in May and June. It may be propagated by seeds or by cuttings of one year old wood. The fruit is edible.

MORUS INDICA.

INDIAN MULBERRY.

Toot—Shahtoot.

This plant is cultivated throughout India for silkworm feeding and also as a hedge plant. It is propagated easily by cuttings planted 2 feet apart. The fruit is edible.

FICUS CARICA.

FIG.

Unjeer.

The Fig requires a well-drained soil, but is not particular as to depth. It responds to manuring and must have copious watering. It is propagated by cuttings of 1 foot long of well-ripened wood. These may be taken at any time. In good soil conditions the tree grows rapidly and will produce a crop within twelve months. It should be planted fifteen feet apart each way. The practice of pruning is little understood, either too severe pruning or none at all being given. The points to recollect in pruning are : (1) if not pruned, the tree produces long, scarggy branches, breakable, and exposed to wind and birds ; (2) the fruit is produced from the development of buds at the base of the leaves on the most recently formed wood. Keeping these points in mind our ideal should be to produce a low urn-shaped tree, bearing fruit all down its stems.

Assuming that a cutting has produced one strong branch, that branch should be cut back to 2 feet long. The branches springing from this should be cut back to 2 feet also, and the branches thereafter allowed to grow naturally till the tree is 5 feet high, when

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further cutting back after the fruiting seasons must be done to keep the tree's head low. Fruits are formed at any time, but those produced in the rains are insipid. The crop which appears in November-December and ripens in February-April is the best. An attempt has been made in the Deccan to force two fruiting seasons into the dry months, but without success. The Fig may be "rested" to force fruiting, just as the Orange is and suffers little from the operation.

The so-called fruit of the Fig is really a swollen hollow branch containing many small flowers in it. In the Figs from Turkey these flowers set hard little seeds which are fertile. The Deccan Fig sets no seeds. A fungoid disease, Fig rust (*Uredo Fici*), attacks the leaves but does not seriously injure the fruit. No remedies have yet been devised against it. The cultivation in India of French, Italian and Turkish Figs is still in the experimental stage. The few adult plants of foreign varieties seen by the editor of the seventh edition have entirely failed to produce ripe fruit. The fruits drop while still small.

ARTOCARPUS INTEGRIFOLIA.

JACK-FRUIT.

Kuntul.

The fruit of this tree is perhaps about one of the largest in existence, and is an ill-shapen, somewhat oval-formed, unattractive-looking object. The interior is of a soft, fibrous consistency, with the edible portions scattered here and there, of about the size and colour of a small Orange. By those who can manage to eat it, it is considered most delicious, possessing the rich spicy scent and flavour of the Melon, but to such a powerful degree as to be quite unbearable to persons of a weak stomach, or to those unaccustomed to it.

If the edible pulp of the fruit be taken out and boiled in some fresh milk, and then be strained off, the milk will, on becoming cold, form a thick jelly-like substance of the consistency of blanc-mange of a fine Orange colour, and of a Melon-like flavour. Treated in this way, the fruit affords a very agreeable dish for the table.

There are said to be two varieties :—

1. The *Khujja*, or hard kind, distinguished by the large size of the edible pulp, and by the abundance and thickness of its juice. The exterior of the fruit is smooth to the hand, and green, and the nuts or seeds comparatively small. The leaves, too, are of a rounder form than those of the second variety.

2. The *Ghila*, or soft kind, is reckoned a much inferior fruit, with the inner pulp small in quantity and its juice scanty, thin, and watery. The fruit is much smaller than the preceding, with a rough exterior, and with the seeds very much larger.

The Jack-fruit is not borne, as most other fruits are, from the ends of branches, but upon stout footstalks projecting from the main trunk and thickest branches of the tree. In no other way, indeed, could its ponderous weight be sustained. The situation of the fruit, moreover, is said to vary with the age of the tree, being first borne on the branches, then on the trunk, and, in old trees, on the roots. Those borne on the roots, which disclose themselves by the cracking of the earth above them, are held in highest estimation.

The tree opens its blossoms and sets its fruit in November, and continues to do so even until March. The flowers when first opened give out a sweet, agreeable scent, very similar to that of the Magnolia pumila.

The tree grows to a considerable size, and is found in nearly all parts of India, but in greatest profusion in Lower Bengal. "It is very rare," one learns, "in the Punjab ; though the few trees they have in Lahore thrive well and bear fruit." Major Drury states, "that if planted in a stony soil it grows short and thick ; if in sandy ground tall and spreading, and if the roots happen to come in contact with water the tree will not bear fruit."

The tree requires a deep, rich, light soil for its best growth. The heavy rainfall and moist air of coastal districts suits it, but on irrigation it can be grown in sheltered situations in any place with a suitable temperature. Fruits begin to appear from the fifth to eighth year of the tree's age. The tree is propagated either by planting the seeds in groups of 4 or 5 in well manured pits 30 feet apart each way, and then keeping the strongest seedling, or by raising seedlings in the nursery and transplanting to 30 feet apart each way in the field.

Roxburgh says that the seeds of the Jack-fruit, when roasted, are not inferior to the best Chestnuts. Those which Firminger roasted, and ate, had, he says, the mealiness and consistency of roasted Chestnuts, but so far from having the fine flavour of the Spanish Nut, had any flavour at all, and were perfectly insipid. They are about the size and form of a large Broad Bean.

Indians use them in their curries, as well as eat them cooked in *ghi*.

The following ingenious mode of training the tree is sometimes resorted to. Sow the seed imbedded in its own pulp. Fix over the young shoot, immediately upon its appearing above ground, a narrow hollow pipe, made by the union of the two halves of a bamboo that has been split in two, in order to remove the enclosures at the knots, and tied together again with string. This bamboo-pipe must be about three or four feet high. The Jack will soon ascend the pipe, and make its appearance at the summit. When it does so, remove the halves of the bamboo. Lay the young shoot, which will be found perfectly supple and pliant upon the ground, and twist it into the form of a spiral coil, with the crown of the root for its centre. Cover this coil well over with earth, leaving the end

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of the shoot to project from the ground. The plant thus treated will grow in about five years' time into a tree, the spiral portion of it below ground enlarging correspondingly at the same time. Upon this spiral the fruit will uniformly be produced and be of the finest quality and largest size.

Not grown on the hills, where it could not exist owing to the cold climate.

ARTOCARPUS INCISA.

BREAD-FRUIT.

A handsome tree with very large polished dark-green, slashed leaves, a native of the South Sea Islands, Moluccas, and Java. The fruit is of an oval form, and of the size of a large Melon, and in general appearance much resembles the Jack-fruit. It is, however, perfectly scentless. Its exterior is not muricated, but is marked with reticulations, with slightly prominent areolæ. It is without seeds, and when roasted is said to resemble the crumb of a new loaf. Firminger states, "I have bought specimens in the bazar at Point de Galle in Ceylon. These, when sliced and fried, seemed to me, as well as to all who partook of them, to be hardly distinguishable from an excellent batter pudding." The tree is probably an original inhabitant of the Malay Archipelago, but is now spread all over the tropics, and grows to perfection in the tropical Pacific islands. There are two sub-species, one producing seeds, and the other not producing seeds, and propagated by suckers. The tree is planted out like the preceding species and fruits at about the same age. Its cultural requirements are similar but it needs greater heat. There are generally two crops per year.

The seeds of the Bread-fruit, it is stated, when roasted are as good as the best Chestnuts. They are about the size of large Peas. The seedless Bread-fruit tree is cultivated for its fruit on the plains of Southern India, especially on the west coast, at Madras and Bangalore.

Cannot be cultivated on the hills, except as a hot-house plant.

BREAD-NUT.

A variety of the above, which produces fruit containing seed, with the exterior split into deep lobes, and covered over with the sharp-pointed tops of the calyces. Lofty trees of this variety once grew in the Calcutta Botanical Gardens, introduced, according to Dr. Voigt in 1794. These had not flowered up to 1814, whence Roxburgh came to the conclusion that "the winters of Bengal were too cold for them." They, however, later blossomed and bore fruit regularly, yielding abundance of seed, from which young plants were raised.

Cannot be cultivated on the hills.

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ARTOCARPUS LACOOCHA.

MONKEY-JACK.

Dêphul—Barhal.

A tree of moderate size, native of Bengal, with handsome, oblong, entire, dark-green leaves, about eight inches long and four broad. In the rains it produces an ill-shapen fruit of the size of an Orange, with a smoothish rind of the colour of dirty wash-leather. It is of an austere taste, but it is sometimes eaten. Propagated by seed in the rains.

Cannot be cultivated on the hills of Northern India.

A fine tree on the Western Ghauts up to an elevation of 4,000 feet. The fruit is not known to be eaten in the south.

BROSIMUM ALICASTRUM.

JAMAICA BREAD-NUT TREE.

Dr. Voigt, quoting Swartz, says that the roasted nuts of this tree are used instead of bread, and have much the taste of Hazel-nuts. The tree was introduced, he says, in 1804, into the Calcutta Botanical Gardens, but had not flowered up to 1814.

In reply to an enquiry made in 1888, Dr. George King said : "Of this I have not been able to find any plant in the gardens," *viz.*, the Calcutta Botanical Gardens.

EUPHORBIACEÆ.

PHYLLANTHUS EMBLICA.

Amla—Awla.

A small, rather handsome tree, with graceful foliage, native of India : admitted sometimes into gardens for the small, round, green fruit it produces in the cold season, which, though exceedingly acid, and quite uneatable raw, is made use of for either pickles or preserves. Propagated by seed sown in the rains.

Cannot be cultivated on the hills of Northern India.

Grows wild in Central and Southern India.

PHYLLANTHUS DISTICHUS.

OTAHEITE GOOSEBERRY.

STAR GOOSEBERRY.

Nuree—Nurphul.

A small tree, native of India, with light graceful foliage : yields a white fruit, in size and form resembling a large, round, ribbed

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button, with a hard stone in the centre. The fruit is commonly used by the natives for pickling. It has a sour, sorrel-like flavour, and is unfit to be eaten raw ; but cooked with sugar it makes a most delicious compote, hardly to be distinguished from a preserve of green Gooseberries. Crops are produced twice in the year, about the end of April and again about the end of August. Plants may be propagated by sowing the stones in the rains.

Cannot be cultivated on the hills, except in the south.

ALEURITES MOLUCCANA.

LUMBANG NUT—INDIAN WALNUT—BENCOOLEN NUT.

BELGAUM WALNUT.

CANDLE NUT OF THE SOUTH SEA ISLANDS.

Desi Akrot.

A tree of moderate size, with large, round, lobed leaves ; native of India; produces a very inferior description of nut, possessing somewhat of the flavour of the Walnut, but of a dense, pithy consistency, like that of a roasted Chestnut. The nut is of a roundish form, of the size of a Walnut, and is contained in a green husk, exactly resembling that of the Walnut. It breaks out into blossom in March with large bunches of small, delicate, white flowers, and ripens its crop towards the end of July, at which time it comes into full blossom again, but without yielding a second crop.

Propagated by sowing the nuts during the rains. Seeds germinate in about five weeks from time of sowing.

ELÆAGNACEÆ.

ELÆAGNUS CONFERTA.

OLEASTER—WILD OLIVE.

The fruit of this tree is of the form and size of a Damson, has a stone in the centre, and when ripe is of a pale red or cherry colour. It is very acid, and though not generally considered an edible fruit, when cooked and sweetened with sugar makes a very agreeable compote. It would, no doubt, answer excellently for preserving. The tree flowers in the cold season, and the fruit ripens about the middle of February or beginning of March, and is borne usually in great profusion. The plant which is a large, scandent shrub, of ornamental character from the silvery appearance of the under-surface of its leaves, is easily propagated by seed sown in October.

LAURACEÆ.

PERSEA GRATISSIMA.

AVOCADO PEAR—ALLIGATOR PEAR.

SUBALTERN'S BUTTER.

Probably a native of Mexico; in this country a moderate-sized tree; but Humboldt states that near Caraccas he met with "enormous trees" of Persea, and that it may be watered with either fresh or salt water. It grows early in Cuba, and its systematic propagation is being undertaken in Florida. Though now tolerably common in Lower India, it does not appear to have been long introduced. The tree comes into blossom in the locality of Calcutta at the beginning of February, bearing sprays of very small, pale yellow flowers; and bears ripe fruit from the end of August to the middle of September.

The fruit in outward appearance bears the strongest resemblance to a very large green pear. In the centre is a stone of about the size of a walnut. The fleshy part of the fruit around the stone is of a bright yellow colour, of the consistency of firm butter, and of the fine flavour of a fresh Walnut; this, eaten with salt, is very delicious. But Sir J. Paxton states that "however excellent when ripe, the Avocado is very dangerous if pulled and eaten before maturity, being known to produce fever and dysentery."*

In this country it is usually propagated by seed sown in September. Sir J. Paxton says that it may be struck from cuttings of half-ripened wood and planted, without mutilating the leaves, in sand under glass. For the multiplication of desirable varieties, however, it is best to bud on Avocado stocks, using buds of the good variety 1½ to 2 inches long. The bud wood should be tender to mature, but green and smooth.

Not grown on northern hills, but ascending to 4,500 in the south.

SOLANACEÆ.

PHYSALIS PERUVIANA.

PERUVIAN CHERRY—CAPE GOOSEBERRY.

Tiparee.

A herbaceous perennial, native of Peru; naturalised at the Cape, and in this country.

The fruit, which exactly resembles that of the Winter-cherry of the English gardens, to which indeed it is closely allied, is concealed

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*"Flower Garden," Vol. II. p. 54.

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in a dry leafy appendage, is of a bright amber colour, of the precise size and form of a Cherry, and is as delicious and serviceable as any berry the country produces. No fruit in the world perhaps affords a more excellent preserve.

Seeds should be sown in May or June, and the seedlings planted out in the open ground in rows four feet apart, and at a distance of two feet from each other. They will thrive in common garden soil, but better in that which has been somewhat enriched with manure. When about eight inches high the plants should be earthed up to half their height. When they come into blossom it will be of advantage to nip off the ends of the shoots, as this will conduce towards keeping them less straggling, as well as towards throwing greater nourishment into the fruit. The fruit ripens from November to January. Though perennial, in cultivation the plants must be treated as annuals ; and the old ones, after they have once borne, be rooted up and thrown away; and in the proper season sowings be made for a fresh supply.

The plant is of a tender nature, and will not endure much cold. Firminger endeavoured to cultivate it several seasons at Ferozepore, but without success. It throve vigorously all the hot season, but the cold destroyed the large crop of fruit before it could ripen.

Not suited for the hills, except in the south where it does admirably. But the careful selection of seed, Sir Frederick Price and Mr. Proudlock both succeeded at Ootacamund and Coonoor, in growing fruit of superior size and quality.

CYPHOMANDRA BETACEA.

TREE TOMATO.

It is within comparatively recent years that this fruiting shrub or miniature tree has been introduced from tropical America and established at hill stations in the south of India. The egg-shaped fruit is produced in great abundance near the ends of the branches, where it often hangs in clusters. At first greenish-purple, it subsequently changes in ripening to yellowish-purple or dull yellow. Although not much appreciated as a desert fruit, the tree tomato makes an excellent preserve. At Coonoor, on the Nilgiris, it is a most prolific bearer, and would yield tons of fruit on a few acres of land. Easily propagated from seed.

APOCYNACEÆ.

CARISSA CARANDAS.

Kuronda.

A small shrub, with dark, shining leaves, and most formidable thorns; native of India, and common in all parts of the counrty. Don describes it as a tree of from fifteen to twenty feet high; but

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one seldom meets with it more than ten feet high at most unless climbing. It is in blossom in February, and the fruit is in season in August and September. A milky juice exudes from the wounded part of the fruit when gathered, which is very adhesive and difficult to remove if allowed to fall upon the hands. There are several varieties, all of which are scandent or subscandent. As climbers, they often attain a great height in the jungle.

The fruit, when ripe, in shape, size, and colour bears a strong resemblance to a Damson; but bears within it a number of small seeds. It is of great value for making preserves. In its unripe state, moreover, it may be used from about the middle of May to the middle of July for tarts and puddings. It has, when cooked, much of the flavour of the green Gooseberry. The trifling toughness of its skin is the principal objection to it. The tree is largely used for hedges.

Plants are propagated from seed sown during the rains.

Not grown on the hills, except in the south of India.

ARDUINA BISPINOSA.

NATAL PLUM.

A small, thorny shrub, native of Natal; bears a strong resemblance to the Kurônda, to which, indeed, it is so closely allied as in general aspect to appear but a superior variety of that plant; very handsome when in full blossom with its bright, sparkling, white flowers, and, as may be seen at the Cape, with its dark, rich fruit ripening upon it at the same time.

The fruit is of the form and size of a small Egg-plum, and when ripe is of a deep purple colour like a Damson or Kurônda. Firminger states, "The gardener at the public gardens at Cape Town told me it was in great request there for cooking purposes, and was held in high esteem.

I raised plants from seed I brought with me from the Cape; but during the six years they were in my garden they were never productive. It has existed many years in the Calcutta Botanical Gardens; but I learnt that it has never produced more than a solitary fruit or two there. I was told by Mr. M'Ivor that it thrives well and bears fruit abundantly at Kulhuttee on the Nilgherries.

Grafted upon the Kurônda, it is rendered productive.

Not cultivated at the Himalayan hill stations."

OLEACEÆ.

OLEA EUROPÆA.

OLIVE.

Firminger states, "The Olive-tree is a native of the south of Europe, and though introduced into this country a great many

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years ago has never, as far as the bearing of fruit is concerned, been cultivated with success. The tree seems to thrive tolerably well, but is unproductive. Dr. Voigt says that it 'was introduced into the Calcutta Botanical Gardens in 1800, but had not flowered up to 1814' ; and Dr. Graham states that 'the climate seems to suit it, and it may possibly hereafter become of some importance.' Trees, however, exist in the Calcutta Botanical Gardens still, but up to the present time have never borne. Trees cultivated in the Lal Bagh, at Bangalore, for 30 years, have not flowered.

The cultivation of the Olive has been attempted of late to some extent in the Punjab, but not seemingly with the prospect of any success. Recent experiments in the N.W.F. Province promise well. A very hot climate, M. Du Breuil states, is as prejudicial to it as a cold one, and that though it has been seen to attain an immense size at Cayenne and St. Domingo, it has never fruited in those parts."

The cultivation of the Olive requires a thorough trial in the drier regions of India not subject to frost. In Tunis, Olives grow well on a rainfall of 8—14 inches per annum without irrigation. The trees are planted wide apart, as much as 60—80 feet from each other, in order to allow of the immense shallow root system of the tree getting a sufficient area for water absorption. Pruning is carefully done each year after the fruits are gathered, in order to give all branches sufficient light to induce fruiting, and to keep the tree of reasonable size. Very possibly the failure of plantings in India is due to the disregard of climatic requirements. Like all trees, the Olive must have manure and be guarded from the attacks of animals, but the first thing necessary is the suitable climate. The next important thing is to plant in a fine sandy loam which has been thoroughly tilled or dug to 20 inches deep and which is kept in a state of fine tilth. The trees are not in full bearing till the 25th year, but fruit may be had from the 8th year. The tree is best propagated by budding good varieties on to seedling stocks.

EBENACEÆ.

DIOSPYROS KAKI.

PERSIMMON.

Bilâetee Gâb.

A large tree, native of China, with large-leaved, handsome foliage ; thrives well, and bears abundantly in the neighbourhood of Calcutta.

The fruit ripens during the month of August, and is about the size of a large Apple, with twin Almond-like stones in the centre. There are varieties, however, which are seedless. The rind is of a rich, ruddy crimson colour, in texture somewhat resembling, but rather rougher than, that of the Peach. It has rather a disagreeable

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odour. In flavour it is suggestive of an over-ripe and very mellow Apple, of which the flesh possesses something of the same consistency, with a little of the taste of a Melon. A fine preserve is said to be made from it by the Chinese. The tree is propagated by seeds, or by grafts. In the case of seedless varieties, propagation by grafts, is, of course, imperative. The tree requires a deep, friable soil, with a fair proportion of clay, but not sufficient to make it compact. It must be irrigated in the dry season. The tree stands considerable cold, and is reported to have survived after undergoing temperatures of 10 degrees below freezing point.

SAPOTACEÆ.

CHRYSOPHYLLUM CAINITO.

STAR-APPLE.

This tree is cultivated in Brazil and Guiana, and grows wild in the Antilles. It is about 30 feet high. The leaves are reddish and silky underneath. The flowers occur in whitish clusters. The fruit is round, of sizes varying from a half to two and-a-half inches diameter, and the colour varies from green to red and violet. The pulp is whitish green or red and contains 4 to 10 seeds.

Dr. Geo. King, writing in 1888 of the C. Cainito, says that the plants in the Calcutta Botanical Gardens "produce a large quantity of fruits every year."

These trees are cultivated much for the beauty of their leaves. Propagated by seed and cuttings.

LUCUMA MAMMOSA.

MAMME-SAPOTA—AMERICAN MARMALADE.

Don says of this tree that it is a "Native of South America ; bears a large oval or top-shaped fruit, covered with a brownish, rough skin ; under which is a soft pulp of a russet colour, very luscious, which is called natural marmalade, from its likeness to marmalade of Quinces. It is cultivated much in the West Indies and South America for its fruit."

Dr. Voigt states that it was introduced from China into the Calcutta Botanical Gardens in 1807, but had not flowered up to 1814. The tree was later cut out or dried.

ACHRAS SAPOTA.

SAPOTA—SAPODILLA—BULLY-TREE—CHIKU.

Naseberry or Neesberry.

This little-known fruit is one of the most delicious produced in India. Along the west coast, especially near Bulsar, it grows exceedingly well. The tree is of the shape of an inverted pyramid, up to 10 feet high and 10 feet across at the top, with branches in tiers and most ornamental foliage. The fruits are borne at the end of short side branches on the main arms. The tree needs shelter from wind, but dislikes shade. It requires an even humid climate and hence does best near the coast. Drainage is essential. Water-logging kills the plant. The plant may be propagated by seeds, grafts, layers or gootees. The seedlings are slower in fruiting, but are better shaped trees than those propagated vegetatively. Planting out in the field should be done with trees at least a year old, in the months of January to March. They should be put in 15 feet apart each way. The number of varieties is not known, but two distinct types of fruit come to the market, namely, long fruits and round fruits, probably from different trees. The fruit has a corky skin like a Potato, a delicious pulp, and hard black seeds. A seedless variety is a desideratum. The first crop is ready in March and April and the second in August and September. The second crop is inferior. The fruit is considered fit for picking when it begins to turn brown and to shed a powder from off its rind. It is essential that this fruit be fully ripe before it is eaten, otherwise its taste is astringent. When fully ripe the pulp turns to a soft deep-greenish hue.

MIMUSOPS KAUKI.

Khirnee.

This is a large forest tree, found in most parts of India. The fruit, which is borne in the hot season, is about the size and shape of a small Grape, bright yellow, and very sweet; but with a milky juice. The tree does not possess any merit to claim for its admittance into the garden, except perhaps for its foliage, which is very handsome, resembling somewhat that of the Camellia, but of a pale olive-green. Propagated by seed sown during the rains.

Not cultivated on the hills, except in the south where it is a forest tree.

RUBIACEÆ.

FLACOURTIA CATAPHRACTA.

PUNEEALA-PLUM.

A small tree, native of India, grows to the height of about twenty or thirty feet, with small leaves and branches covered with numerous thorns.

The fruit ripens during the months of September and October, and is of the form and size of a Cherry or Tiparee, slightly compressed into a five or six-sided shape. It is of a deep dull purplish

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chocolate colour. In flavour it is suggestive of something better than a Sloe, but worse than an indifferent Plum. The usual plan before eating it, whereby it is rendered softer and more agreeable, is to turn it round between the thumb and forefinger, gently pinching it at the same time and then roll it between the palms of the hands. By this means it becomes much sweeter in flavour, losing that austerity it previously had. It affords an exceedingly nice compote when cooked with sugar.

Plants are propagated from seed sown in June and July. It requires no particular cultivation. Not cultivated on the hills.

FLACOURTIA INERMIS.

TOMI-TOMI

This tree, which is easily distinguished from the foregoing by its being entirely thornless, and by its large, handsome leaves, bears a somewhat similar but very inferior fruit a month or two later in the season. Cultivation same as for the foregoing.

VANGUERIA EDULIS.

GOA VANGA.

A small tree, covered with formidable thorns; native of Madagascar; produces what is said to be a good dessert fruit, eaten by the natives of Madagascar and the Mauritius. Plants were in existence in the Calcutta Botanical Gardens for a great many years, but none are to be found there now. It has a rather large stone in its centre, by the sowing of which the tree may be propagated.

PASSIFLOREÆ.

CARICA PAPAYA.

PAPAYA—PEPITA

This excellent fruit is easily grown. It is propagated by seeds, but may also be propagated by cuttings. It needs a rich well-drained soil, and is very sensitive to waterlogging. Plants raised from seeds are ready for transplanting to the field in three months and should be put out 10 feet apart each way. There are two main types of tree: (1) the male, producing long, hanging clusters of narrow trumpet-shaped flowers, setting no fruit; and (2) the female producing large, white flowers on the main stem and setting fruit. Until the flowers appear the two kinds of tree are indistinguishable and hence twice the desired number of seedlings must be planted, and all the males, except four per acre, cut out when they are recognisable. Trees intermediate in character between male and female occur, and produce unsatisfactory fruit. It has also been proved that such trees, and occasionally male trees, gradually change

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their sex. One occasionally comes across abnormal fruits, looking like distorted hands, or containing one fruit inside another. Such abnormalities are due to unusual development of certain floral parts, usually the stamens. Flowers appear in 8 to 10 months from planting and fruits are formed continuously. There is no definite flowering season. It is necessary to thin out the young fruits to prevent them crowding each other. By judicious thinning, fruits weighing 4 lbs. each have been produced. It is also a good thing to cut off the top of the young tree, thus forcing it to branch. Each branch bears fruits, and the bearing capacity of the tree is multiplied. As a rule the tree is exhausted after 5 years' continuous cropping. The fruits on the tree must be protected from the direct rays of the sun or they scorch and split. The dead leaves of the tree should be removed as they dry up. The fruit is cut from the tree when full sized, but green, and laid on soft straw to ripen. The even ripening of the Papaya is a subject needing study. When ripe, the skin has a yellowish tinge, and the flesh is full-coloured and juicy. The fruit does not last long after ripeness sets in, and should be eaten within two days.

Of actually well-defined varieties, India has few. Some introduced varieties, such as the Washington, have become established.

Cannot be cultivated on the hills, except in the south where it is productive up to 4,000 feet.

PASSIFLORA.

GRANADILLA.

Firminger states : "There are about four or five varieties of Passiflora described as bearing edible fruits, called Granadillas.

1. *P. quadrangularis.*—COMMON GRANADILLA, bears a fruit of an oblong form, about as large sometimes as a child's head. The flavour is sweet and slightly acid, very grateful to the taste, and refreshing in a hot climate, where it is usually eaten with wine and sugar.

2. *P. maliformis.*—APPLE-FRUITED GRANADILLA or SWEET CALABASH.

3. *P. laurifolia.*—WATER-LEMON, is most extensively cultivated in the tropics, being agreeable to most palates.

4. *P. edulis.*—PURPLE-FRUITED GRANADILLA, produces fruit of the size and shape of a hen's egg, green at first, but when ripe of a beautiful plum colour.

5. *P. incarnata.*—FLESH-COLOURED GRANADILLA.

In addition to the above thus described by Mackintosh,* might perhaps be numbered Tacsonia mollissima, which I have seen at

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* "Greenhouse," p. 380.

Ootacamund, bearing in great abundance a pale-green fruit of the size of a goose's egg, and of a rather agreeable flavour, but the plant does not seem able to bear the climate of the plains.

P. quadrangularis is the only Granadilla that has been known to bear fruit here, and that not commonly about Calcutta. I found the plant in a garden at Gowhati, grown upon a Bukayun tree, and bearing in great profusion in December ; but the fruit fell far short of the description given of it above, both as to size and flavour, being of an oblong form, of the size of a large Lemon, and very insipid to the taste : It was sometimes put into tarts, but required flavouring. The natives used it also for curries. A writer in *Rees' Cyclopædia* says : 'To flower and fruit in perfection, it requires to be cut down every year to the main trunk, which soon acquires the size of a small Cherry-tree. We have seen it laden with huge flowers, magnificently variegated with violet purple and crimson and green, with leaves a foot long.' P. maliformis does not appear to have been yet introduced ; and P. incarnata formerly in the Calcutta Botanical Gardens, does not exist there now.

If the plants be worth cultivating for their fruit, which is very questionable, possibly success might be arrived at by attending to the mode of cultivation prescribed for the purpose.

The following is Mr. Appleby's mode of setting P. quadrangularis :—

'The whole of the calyx, corolla, and crown must be cut off with a sharp pair of pointed scissors, and this must be done without injuring the flower-stem. When all these are cut away, there only remain the essential parts of the flower—the stamens, five in number, and the three stigmas. Then cut off one or more of the stamens bearing the anthers ; and do this without shaking the dust or pollen out of the anther, covering them with the fertilising powder. Take an opportunity of performing this operation early in the morning, at the very time when the anthers are observed to be bursting.[*]

'When the crop is all off, the shoots must be well cut in. As little old wood as possible besides the main stem, and a few pieces (about two or three feet of each) of the old branches, should be retained ; for all that is to be trained to bear in each year ought to be the growth of two years' standing.' "[†]

Propagated by layers and seed.

Cultivated on the northern hills in a glass-house.

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[*] "Cottage Gardener's Dictionary." p. 439.

[†] Sabine, in "Hort. Trans."

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ONAGRACEÆ.

TRAPA (BISPINOSA) BICORNIS.

WATER CALTROPS—WATER CHESTNUT.

Singhâra—Pâneephul.

A common aquatic plant, native of the tanks in Bengal and much cultivated in many parts of India for the nuts it bears. These are sometimes quite black, of very curious form, resembling a bullock's head, with two large horns. They are most agreeable when peeled and fried. The plant is rather an ornamental one, especially when in the rainy season it opens its pure white flowers towards the close of the day. It is propagated by sowing the fruits in tanks.

It is abundant and useful in the Cashmere lakes, where a spineless variety is found.

MYRTACEÆ

PUNICA GRANATUM.

POMEGRANATE.

Anâr.

Firminger states : "The Pomegranate tree is common in all parts of India, but never produces fruit at all to be compared with that brought down annually by the Afghan traders from Kabul.

There are two kinds met with in the neighbourhood of Calcutta : the *Dêsee*, or country kind, a hard, dry, valueless fruit, and the so-called *Patna* kind, of much larger size, and in high estimation among the natives.

Captain Burton describes three which he met with in Arabia :—

'1. The best is *Shâmi* (Syrian) : it is red outside, and very sweet. I never saw in the East, except at Meccah, a finer fruit than the *Shâmi* ; almost stoneless, like those of Muscat, they are deliciously perfumed, and as large as an infant's head.

'2. The *Turki* is larger and of a white colour.

'3. The *Misri* has a greenish rind, and a somewhat sub-acid and harsh flavour.' *

Sir A. Burnes also mentions a 'famous Pomegranate without seeds grown in gardens under the Snowy Hills near the Cabul River.'

The finest varieties of this fruit, however, seem to have been quite unknown in India till very recently.† Mr. W. H. Bartlett sent to the Agri-Horticultural Society seed of fruits he had raised 'from Cabul stock' in his garden at Buxar. One of these fruits, he states, was of the size of 'an ordinary human head,' and one of 'a small Shaddock.' He manured and constantly well watered the tree, he adds, till it showed signs of flowering, and afterwards while the fruit was ripening.

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*"Pilgrimage to El Medina and Meccah," Vol. I, p. 388.

† Feb. 5, 1874.

The Pomegranate will always maintain its place in an Indian garden if it be only for the splendour of its brilliant scarlet blossoms, which no flower can surpass, and which it produces more or less during all the hot season and rains. It bears its fruit principally during the cold season, which, if not protected in due time, is almost sure of being destroyed. An insect, which I have detected to be a certain hairy caterpillar, penetrates the hard rind when the fruit is a little more than a quarter grown, and by devouring part of the interior, causes the remaining part to canker and rot. To obviate this, the fruit, when as yet small, should have the large fleshy calyx by which it is surmounted cut cleanly off, and then be tied up loosely in a piece of linen cloth.

The native mâlees recommend a large proportion of soorkee (bricks broken fine), together with old, decayed cow-dung, to be mixed with the soil in which the Pomegranate is grown. It is not, however, particular as to soil. It succeeds even in the driest, but it does not thrive in one that is surcharged with wet. To yield fine fruit it must be manured each year. This is best done perhaps in December. The Pomegranate sends up a great deal of young wood from its base, which should from time to time be cut clean out, as it not only chokes up the plant, but tends to withdraw the nutriment which should go to the fruit-bearing stems. The fruit is produced from the extremities of the young branches formed the same year which after bearing it is well to cut closely in.

Plants may be multiplied either by seed, by cuttings, or by layers, put down in February. The best plan is to raise seedlings, and to graft upon them, when of sufficient height, from trees of a superior kind."

The fruit-boring insect mentioned by Firminger is *Virochola Isocrates* (known as *Sursa* in the Deccan). The small, bluish moth lays eggs, of the size of a pin's head, on the very young fruit and the caterpillar emerges from this and at once bores into the fruit, where it lives till it is ready to emerge as a moth. To safeguard its existence it sometimes spins a kind of web, fixing the fruit to the branch. Firminger's treatment is effective. The treatment can now be better done by using strong paper bags (*e.g.*, using the so-called "Kraft" paper).

Firminger's recommendation to graft from trees of a superior kind is sound, but not all superior varieties will thrive away from their own natural surroundings. Thus, the Cabul Pomegranate, both on its own roots and when grafted on Poona stocks, has done very badly in Poona, making little growth and producing few fruits. The trees should be planted out 10 feet apart. They bear from the second year. Any of the three flowerings (January, June or October), may be taken by stopping water for six weeks before.

It is not successfully cultivated on the hills. It does well up to 4,500 feet in the south of India. There is a "double" variety of Pomegranate, which is decorative but produces no fruit.

PSIDIUM GUAVA.

GUAVA.

Pyara—Unjeer.

Umroot—Sufree-Ām.

Firminger states : "The Guava tree is said to be a native of South America, whence originally it was introduced into this country. It is, however, so thoroughly naturalised in all parts of India as to lead one to suppose it must be indigenous to this country, a conclusion Wight seems to have come to, as he has included it in his 'Prodromus.'

"It is a vigorous, stout-growing shrub, rising sometimes to become a small tree of fifteen feet high or more. It commences to blossom during the hot season, and continues to do so, as well as to bear fruit during the rains, up to the end of the cold season. The finest fruit, however, is to be met with when the general season of bearing is over. About the end of January fruit of extraordinary size and beauty are usually exhibited at the Calcutta Horticultural Shows. The finest fruits are cultivated in Allahabad and its districts.

"To preserve the fruit on ripening from being devoured by birds, bats, and squirrels, each one at an early stage must first have the calyx on its summit cut clean off, and then be tied up loosely in a piece of fine cloth.

"Young plants are easily raised from seed during the rains ; but to make sure of a good kind, propagation by layers is usually resorted to. Rooted suckers, also, may be occasionally taken from the base of the main stem. It requires no particular cultivation, and thrives in any soil.

PEAR GUAVA.

"Of this there are two varieties.

"1. The fruit of the best cultivated kind is of the size and form of a Lemon, with a perfectly smooth exterior, of a pale straw colour outside and white within ; soft as butter, with a very strong perfume. This is borne one only upon the footstalk.

"2. *Câffree* is the native name of a variety very distinct in appearance from the previous one. It is a large irregular-formed fruit, warted and furrowed not unlike a Citron. Of the two kinds this is considered somewhat the inferior, though the difference perhaps is trifling. Of this variety I have observed as many as three borne on the footstalk.

APPLE, OR RED GUAVA.

"The shrub that bears this variety is somewhat smaller, with smaller and darker leaves, and is distinguished also by bearing more than one flower on the footstalk. The fruit, which is red inside, is of a fuller and more strawberry-like flavour, but has generally the fault of being densely filled with seed.

"Why the one variety should be denoted as the Pear and the other as the Apple it is difficult to tell; for in external appearance they are commonly so decidedly similar that, until cut open, it is impossible to distinguish the one from the other."

Firminger's statement that the Guava needs no special cultivation requires some modification. It is true that the Guava grows easily, and is even a pest in Jamaica. The best results however in quality and quantity of fruit are secured as follows:—First, get a good variety and graft it on strong local stocks. The points of a good variety are (1) lack of seeds or small number of seeds, (2) succulent, well-flavoured flesh, (3) good keeping quality, (4) brilliant, smooth skin. The trees when two feet high should be planted out 20 feet apart, and from the first pruned into a spreading, low head. Unless so pruned the plant becomes a scraggy, shapeless tree with fruit exposed to the birds at the ends of long branches. Flowering may be forced as for the Pomegranate. The flowers usually appear at the bases of the third and fourth pairs of leaves on the new growth. This leads one to believe that after the fruit has set, the pinching of the shoot several leaves above the fruit would cause them to swell more quickly. Training of the Guava tree on wires like a Vine has been tried with success at Poona. Guava trees suffer from aphis, which must be treated by spraying.

PSIDIUM CATTLEIANUM.

PURPLE-FRUITED GUAVA.

Don describes this species of Guava as "a tree of from ten to twenty feet in height; a native of China." Sir J. Paxton makes it synonymous with *P. Chinese*; but whether a distinct variety, does not appear. It has been described as a fine foliaged plant, whose thick, leathery, perfectly smooth, obovate leaves somewhat resemble those of *Camellia Japonica*. Sir J. Paxton says of it:—

"Not many plants have a greater claim on our attention. Its dark, shining foliage and pendulous branches make it a great orna-

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ment........ It is, perhaps, the most perfect and graceful evergreen that an amateur of plants ought to desire, or even can possess."*

The fruit, according to the description given of it, is of the size and form of a large Plum, of a deep claret colour. It is very possible identical with the Strawberry Guava described later.

Firminger states : "There seems a doubt whether this species, by all accounts so desirable, has ever been introduced into this country, Dr. Voigt enumerates it among the plants still wanting up to the year 1841. A solitary, small tree exists in the Calcutta Botanical Gardens, which the mâlees point out as having had the name assigned it by Dr. Wallich, but is far from answering to the description of the plant given by Don and others. It has never yet yielded fruit. Another small plant, likewise of recent introduction, has been shown me there, which corresponds more nearly with the ordinary descriptions ; but as it has not fruited or flowered, the matter is still uncertain. I notice, however, that *Psidium Catteianum* is comprised in the List of Plants in the Calcutta Botanical Gardens, recently given by Dr. Anderson. Dr. George King states (in 1888), that the plants in the Botanical Gardens 'do not produce fruit, but have been known to flower.'"

PSIDIUM PUMILUM.

A moderate-sized shrub, native of India ; at once recognisable by the smallness of its leaves, resembling somewhat those of a Myrtle. It bears in the rains, and its fruit which is small and of the shape of a Crab-apple, has a fine, Myrtle flavour and is very sweet, but full of seed, by which it is freely raised, if sown during the rains.

PSIDIUM GUINIENSE.

GUINEA GUAVA.

A shrub of the height of eight to twelve feet ; native of Guinea ; said by Don to bear a "berry fulvous, rather pubescent, red inside, about the size of a Nutmeg, and of an exquisite taste."

PSIDIUM POLYCARPON.

MANY-FRUITED GUAVA.

A moderate-sized shrub, said to be a native of Trinidad, and described by Don as bearing a fruit of delicious taste. The fruit produced by the plant to which the name was assigned in the Gardens of the Agri-Horticultural Society was a poor, turpentine-flavoured berry, quite worthless ; pale yellow, Pear-shaped, and of the size of a Plum. The plant blossomed at the end of March, and ripened its fruit at the beginning of July.

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*Magazine of Botany," Vol. I, p. 118.

Propagated by seed sown in July and August.

PSIDIUM SP.

STRAWBERRY GUAVA.

This species, which may be *Cattleianum*, is a small low shrub, with large, dark, pendulous, shining leaves, and ripens its crop about the end of September, after which it blossoms almost immediately again, and ripens fruit a second time in December.

The fruit is of the size of a Nutmeg, pale yellow, contains a soft pulp, and possesses in a high degree the delicious fragrance and flavour of the Strawberry. It has, however, the great fault of being densely full of small, hard seed.

Propagated easily by seed sown in February.

RHODOMYRTUS TOMENTOSA.

HILL GUAVA—HILL GOOSEBERRY.

This is a remarkably handsome shrub, with fine, dark foliage, bearing numerous pretty pink blossoms, which resemble somewhat those of the Peach.

From the fruit, which is a berry of a pale, dirty-yellow colour, a jelly is made, in flavour a little like Apple jelly.

The plant is found in abundance amongst the jungle of the Nilgherries. It has been introduced into the plains, where, however, it does not thrive. Under cultivation on the hills, this fruit is not to be despised.

EUGENIA JAMBOLANUM.

Jamun, Jambul.

A large timber-tree, with fine verdant foliage, very common in all parts of India; blossoms at the beginning of the hot season, and bears, about the beginning of the rains, a juicy kind of fruit, with a stone in the centre, much resembling a Damson in appearance, with a flavour peculiarly its own. There are three varieties; the best, a somewhat larger fruit than the others, is found in the United Provinces, and is not at all a fruit to be despised.

Propagated by sowing the stone during the rains.

It is one of the common trees of the jungle at Mahableshwar, in the Western Ghauts, a place with enormous rainfall, an elevation of 4,500 feet, and a laterite soil. The wild bees there get most of their honey from the Jambul flowers, and it has a distinctive taste in consequence.

EUGENIA MICHELII.

BRAZIL CHERRY—CHERRY OF CAYENNE.

A large, handsome, bushy shrub, native of Brazil, bears small, pale green, uninteresting flowers. It ripens its fruit in May.

Not suited for the hills.

The fruit is about the size of a button, round and ribbed, and is considered agreeable by the natives.

It blossoms again in June, but does not yield a second crop of fruit.

Propagated by seed and by layering.

Not suited for the hills.

EUGENIA JAMBOS.

ROSE-APPLE—JAMBOSADE.

Goolâb Jâm.

A tree of rather handsome growth, with verdant, oleander-formed leaves, a native of India, where, Dr. Voigt states, it belongs to both peninsulas. Dr. Riddel says that in the Madras Presidency he has only met with the fruit at Hyderabad, and that he has made every attempt to introduce it elsewhere without success. It blossoms with large, greenish-white flowers in February, and bears fruit in the rains and during the cold season. The fruit is exceedingly handsome, being of the size and somewhat of the form of a small Apple, of a fine opaque Apricot colour with a beautiful blush of red upon it, and with a fine, delicate, Rosewater perfume. It is, however, cultivated more for ornament than for use, as it can hardly be considered eatable, being of a poor flavour and of a dry, pithy consistency.

This evergreen tree requires a good deal of moisture, and is seen to perfection when growing by the side of canals, tanks, or running streams. It fruits freely at Bangalore, but suffers from long periods of drought.

Plants are propagated by seeds or by layers during the rains.

Not suited for the hills, except in the south of India.

EUGENIA MALACCENSIS.

MALAY APPLE—OTAHEITE CASHEW.

Malaka Umrool.

A remarkably handsome tree, with fine, large, laurel-formed, verdant, deep-green foliage; native of Moluccas. It blossoms in the hot season, with large, beautiful, crimson flowers, and towards the end of the rains and during the cold season ripens its fruit. The fruit is of the size and form of a very small Apple, perfectly smooth, of a pure, translucent white with a beautiful blush of crimson. Some persons eat it, but it is not worth eating.

Plants may be propagated by seed or by layers during the rains.

Not suited for the northern hills.

EUGENIA ALBA OR JAVANICA.

Jumrool.

A moderate-sized tree, with large, dark, handsome foliage, native of the Islands of the Indian Archipelago, very ornamental when covered with its crop of fruit, in the rainy season.

The fruit is of the size of a small Apple, pure white, shining, and wax-like, has a raw, watery, insipid taste, and is hardly fit to be eaten.

Propagated from seed during the rains.

Not suited for the hills.

EUGENIA AQUEA.

Lâl Jumrool.

A tree of considerable size, native of India, with foliage of large, noble, lanceolate leaves ; blossoms in March, and bears fruit in May and June, when, as Roxburgh truly says, it is "conspicuously beautiful with the drooping branches of the full-grown, brilliant-coloured fruit appearing through the dark, deep-green leaves."

The fruit is of the size of a small Apple, of a waxy appearance, and has a somewhat aromatic taste, but is hardly eatable. There are two varieties, the one perfectly white, and the other of a beautiful, lively, pale rose colour.

Propagated from seed during the rains.

Not suited for the northern hills.

COMBRETACEÆ.

TERMINALIA CATAPPA.

INDIAN ALMOND.

Dêsee Badâm.

A large, forest tree, native of India, of handsome, stately growth, with long branches spreading horizontally, and clothed with large, noble, dark-green polished foliage ; produces a nut of a fine, filbert-like flavour, with a crispness like that of a fresh Walnut ; beyond comparison the most delicious of any kind the country affords. The kernel resembles a small fold of white paper, and is contained in a large, green husk of the size and shape of the shell of an Almond, of remarkable toughness. The kernels, when extracted, are generally put on the table in a plate of water.

It blossoms and bears its crop twice in the year. In the month of May it bears a crop, and at the same time comes into blossom with a profusion of small, white flowers, closely crowded together upon long spikes, resembling somewhat those of *Buddleia Asiatica.* The second crop comes into season at the beginning of the cold months. Propagated by seed sown in July.

Not suited for the hills, except in the south.

ROSACEÆ.

CHRYSOBALANUS ICACO.

CALLIMATO-TREE : SPANISH NECTARINE.

Icaco—Cocoa-plum.

The fruit of this tree is described by Don as—

"About the size of a Plum, ovate, roundish, varying much in colour, red, yellow, or commonly purple ; the pulp white, adhering firmly to the stone ; the taste sweet, with some austerity, but not unpleasant ; eaten either raw or preserved ; sold in the markets in the West Indies."

Dr. Lindley states that it "requires a cool moist soil to bring its fruit to perfection."*

AMYGDALUS PERSICA.

PEACH.

Aroo.

The Peach grows to perfection at Peshawar and Quetta, and at other places where the trees get a thorough winter rest. At elevated stations where there is not the same severe check the fruit can still be grown fairly well. At Pusa, in Bihar ; at Panchgani, on the road to Mahableshwar, in the Bombay Presidency ; at Bangalore ; and at Saharunpore, good Peaches are produced. In Poona the Peach tree is a dead failure, growing into a scraggy bush, whose flowers drop without setting fruit. The Peach thrives best in a deep, sandy, well drained soil. It cannot stand heavy, damp soils. Trees are produced by budding in spring or early summer on seedling stocks. The trees are best planted out 20 feet apart each way in the early spring. Watering is necessary till the fruit begins to swell, after which no more should be given. The tree should be pruned in winter to produce an open, urn-shaped plant. Manure as for the Apple.

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* "Transactions of the London Hort. Soc'," Vol. p. 78.

The Peach may be budded on a Peach stock, and this is the common practice ; but budding on the Almond or Plum gives even better results. The ring-budding method is used in some parts and answers well. In Quetta the Peach suffers from an obscure disease, which shows itself in the dying of branches and the extrusion of gum. In over-irrigated and badly cultivated orchards this disease is more conspicuous. The suggested remedy is moderate watering and good cultivation with plenty of soil aeration all along. A huge aphis is also found in colonies on Peach trees. A contact poison should be sprayed on affected trees.

When raising stocks in the nursery for budding on, it is best to plant the seeds 1½ feet apart along the two edges of a water channel 2 feet broad and 4 inches deep, whence water reaches the seedlings' roots by seepage. The ground between these channels is 2 feet broad and is kept thoroughly harrowed and never directly watered on top.

Imported English and American Peaches are often less satisfactory than the country varieties, especially in climates which are dry and hot during part of the year.

AMYGDALUS PERSICA VAR. LÆVIS.

NECTARINE.

The Nectarine is a bud-variation of the Peach, the difference being that it is a cling-stone, and has a perfectly smooth rind, like the Apricot. All therefore that has been said regarding the cultivation of the one applies alike to the other.

PRUNUS ARMENIACA.

APRICOT.

Zurd Aroo.

This plant grows wild in parts of the Himalalya, and its cultivation is best in the Western Himalaya. It needs a severe winter rest. In the hotter parts of India it grows and may flower, but does not set fruit as a rule. It is budded on Apricot stock. The cultivation is as for the Peach. Occasionally it is budded on Peach stock, and is said to grow very vigorously upon it.

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PRUNUS DOMESTICA.

PLUM.

Aloocha.

Firminger states "The Plum has been grown in the vicinity of Calcutta a great many years ; but of what variety it is difficult to say, for the plants have hardly done more than just set their fruit, and then drop them. A rather small, dark kind of Plum, however, seemingly the fruit in its original wild state, is met with in most parts of India, and even as near Calcutta as Hooghly. The fruit is uneatable unless cooked, and in this condition is very delicious in tarts, preserves, and puddings.

In the North-West Provinces plants of two or three varieties are issued, from the Saharunpore Botanical Gardens ; one in particular ripening a fine amber colour. But these, too, were hardly palatable, except when cooked or preserved, and for this purpose they were equal to the finest European kinds.

I was surprised to find on the Nilgherries that the Plums grown there, though large, handsome fruit, were nearly as unfit for the dessert as those produced on the plains in the north of India.

The general mode of cultivating the Plum in this country is as near as possible the same as that adopted with the Peach.

Dr. Biddel states that he never succeeded in budding the Plum on the Peach. At Ferozepore I made many buddings of the Plum on Peach stock, and found not the least difficulty in doing so. The plants, however, made such prodigious growth as to become quite unmanageable. It seems far preferable to bud upon seedlings of the Plum itself as stocks."

Of many kinds tried at Bangalore, Kirks Blue, Green Gage, and Golden Drop, are the best.

It is successfully cultivated on the hills, in the same way as the Peach.

PRUNUS BOKHARENSIS.

BOKHARA PLUM.

Aroâ Bookhâra.

The fruit of this tree is well known in India from the quantities of it brought down annually in a dried state from Cabul. The tree itself thrives vigorously in the Upper Provinces, and is very common in gardens in the Punjab, where it bears abundantly. The fruit makes a good preserve, but is only eatable when cooked. Cultivation same as for the Plum.

This is successfully cultivated on the hills.

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CERASUS VULGARIS.

CHERRY.

Every attempt to cultivate the Cherry in the plains of India has hitherto proved an utter failure. There seems not the remotest probability of its ever being brought to succeed in a climate so decidedly uncongenial to it.

Two or three species of Cherry, however, indigenous to India, are met with in the hills. One, *C. Jenkinsi*, a native of Khassya, thrives and bears fruit at Gowhatti ; but such as is only eatable in tarts or preserved in brandy.

It is grown to perfection on the hills, with a little care. Propagated by seed sown in September.

CYDONIA VULGARIS.

QUINCE.

Bihee.

The Quince tree is not uncommon in the Upper Provinces. At Lahore it ripens fair-sized fruit at the end of June and in July, which is used for preserving, and is only eatable when cooked. Dr. Voigt states that the tree has been in the Calcutta Botanical Gardens many years without blossoming. Dr. Riddel says that the fruit is plentiful at Satara, and that he has met with it at Poona, and that he has seen the tree blossom elsewhere, but not produce fruit.

It is propagated usually by cuttings, which strike very readily. It is largely grown on the hills, and cultivated like the Apple.

PYRUS MALUS.

APPLE.

Seb, Safarchand.

The following passage is reprinted verbatim from the fifth edition of this work as it gives a brief historical account of the Apple in India : "There are certain localities in India in which the Apple appears to be cultivated with complete success."

In April 1837, Major Moore sent some Apples to the Agri-Horticultural Society from Hyderabad, remarking :—

> 'I have this day sent you a specimen of the Nonpareil Apples grown in my garden ; and those which we have taken from the same tree have been fully as good as any I ever tasted in England. Some I have taken from the tree measured ten and a half inches in circumference.'*

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* "Agri-Hort. Soc. Trans.," Vol. V, p. 21.

In Tirhoot, Mr. S. French is reported to have grown Apples of a superior kind in the year 1838. And at the Calcutta Horticultural Show in March 1854, a few splendid, large, and well-flavoured Apples from Mr. William Moran's garden in Tirhoot were placed on the table.

In 1858 I tasted some very large specimens of an excellent Apple grown at Duronda, in Chota Nagpore, sent to the Agri-Horticultural Society. These bore every resemblance to the Russet, so valuable for cooking purposes in England. In our gardens at Ferozepore we had a small and very delicious Apple, like the White Joanneting, but superior to it in flavour, produced in great abundance during the month of April. It is difficult to tell where this Apple originally came from. It seems to have been not at all known lower down the country, as a visitor from Umballa, who was with me during the time it was in season, told me he had seen nothing of the kind there. It is unknown also, I am informed, in the Punjab.

Dr. Riddel enumerates as many as four varieties of Apple met with in the Deccan, namely, two English varieties.

1. The BROWN RUSSET (probably the kind before mentioned as sent from Duronda).

2. A yellow striped PIPPIN.

And two Persian sorts of a small description, commonly found in most native gardens in the Deccan :

1. One, sweet and luscious, grows in bunches.

2. A larger, with a rough taste, better adapted for tarts.

A species of Apple, *P. Indica*, is found indigenous in the Khassya Hills, of which ripe specimens were brought to me at Gowhatti in the month of February. They were of the size and form of the Golden Pippin, of a deep, burnished, gold colour, spotted with crimson, and scarred a good deal with russet ; and of a fine, Quince-like odour. They were too austere and tough to be eaten raw.

There are some localities, however, where it has been pretty well decided that this fruit cannot be grown with any degree of success. According to Dr. Gibson—

> 'The Apple attains some size in the higher level of Ahmednuggur, but it is not such as to be worthy of a rank with either the English or tropical fruits.'*

At Ootacamund, in the Nilgherries, where the Apple might very reasonably be expected to thrive to perfection, I met with nothing better than mere Crabs, both as regards size and flavour. At Bangalore, too, another locality seemingly most favourable for the growth of this fruit, several varieties were brought me for sale

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*Dr. Spry's "Plants for India," p. 62.

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when I was there in April 1859. But nearly all were unsound, and a most exorbitant price was asked for them. Since then there has been some improvement in the quality of the fruit cultivated in these localities.

At Bangalore the names of Apples are curiously substituted by numbers, which run from 1 to 24. The native growers stick to this arrangement firmly, and will have nothing to do with proper names. The best varieties in cultivation are Ribston Pippin, Worcester Pearmain, Peasgood's Nonsuch, Lane's Prince Albert, Kentish Fillbasket, Dutch Codling, and Cox's Orange Pippin.

At Calcutta the cultivation of this fruit has uniformly proved a failure. In the year 1850 some young Apple-trees were brought to Calcutta in a ship laden with ice from America. Being kept dormant by the cold of the ice, on which they were laid, they arrived in full health and vigour. They were purchased by the Agri-Horticultural Society, and have by this time become large thriving trees in their garden. They have blossomed often ; but if they have set fruit, it has been only to drop it immediately afterwards.

Apples come to perfection in the Kangra Valley, whence they are exported in large quantities to the plains. Government Orchards have now been established in Kumaun, where Apples of choice English sorts are cultivated on a large scale, under the supervision of a European Gardener, and are largely exported to the plains. The Jhalna Apples are now well known in the large stations on the plains and in Calcutta itself ; while every effort is being made to extend their cultivation in those parts, and on the Himalayan Sanitariums, such as Simla, Mussoorie, etc. The cultivation at these places is almost similar to that in Europe."

The gist of the matter is that to cultivate Apples successfully in India one must have a climate with a definite winter, when the trees can get a rest. Apple-trees grown in climates with no definite winter run to wood. They may produce blossoms, but these mostly fall off, and any fruit produced is sour and useless. Hence the Apple-growing areas are in or near the Himalayas.

The Apple likes well-drained, clay loam, in a high situation where frost is less likely than in the bottom of a valley. Young plants are got by grafting or budding on to seedling stocks. The spring is the time for this operation. The trees are planted out in well-manured pits 20′ × 24′ part, after pruning the roots and heading back the scion. In the first four years the frame-work of the tree is built up by pruning. The ideal is an open, urn shape. Pruning for shape may be done in the autumn. Light summer pruning assists flowering and fruiting. Manuring should be done yearly, giving a good top dressing of farmyard manure at the rate of a ton per acre, made of 4 cwt. bonemeal, and 8 cwt. wood ashes. Green manuring is also beneficial.

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PYRUS COMMUNIS.

PEAR.

Nâshpâtee.

The Pear tree thrives well in most parts of India. In Bengal as low down as Calcutta it blossoms, but never sets fruit; but in gardens at any distance beyond about a hundred miles higher up, fruit is often met with, of moderate size, very hard, and unfit to be eaten uncooked, but excellent for baking and stewing. Pears of this description, too, Firminger learnt from General Jenkins, had been introduced from the Bhutan Hills, where they are indigenous.

"Any mellow and melting kind of Pear has not, I believe," says Firminger, "been cultivated with success on the plains of India. Possibly Pears of this description may have been introduced; but as the Pear is a fruit which does not ripen upon the tree, but which, after being gathered, requires to be laid by some time in a cool place before it becomes mellow, it is not likely perhaps that in this country it can ever be cultivated with satisfaction for the table. In the Kangra Valley, and some of the lower ranges of the Himalayas, they are grown to perfection, and exported to the plains. Young plants of two or three varieties were brought a few years ago to Calcutta in a ship laden with ice from America. These were purchased by the Agri-Horticultural Society for their Gardens, have grown vigorously, and are now fair-sized trees. They produce blossoms abundantly every year, but nothing more."

The Pear tree is easily propagated by layers and grafting; the latter operation should be performed in February and March; cuttings will also strike readily if put down in February and during the rains. The cultivation recommended for the Apple will suit the Pear.

In Simla and other hill stations the Pear can be brought to great perfection under cultivation. Pruning on the hills should be done in February, just before the trees burst into leaf after their winter rest. The fruit ripens about August and September.

ERIOBOTRYA JAPONICA.

JAPANESE MEDLAR.

Loquat.

A small tree with handsome foliage and large, noble leaves; native of Japan and China; succeeds in most parts of India. The fruit, borne in clusters, resembles a very small Pear. Although there are no distinct varieties specially named, there is a great difference in the fruit produced from different trees.

One sort is remarkable for its deep apricot colours, while another ripens of a light primrose colour. Others are more or less distinguished by their acidity or sweetness, or the largeness of their stones and by the size of the fruit itself, some of which are perfectly spherical in shape.

The merit of this most delicious fruit will depend much upon the cultivation bestowed upon it. The season is usually very dry when the fruit is swelling. An abundant supply of water at that period, as well as occasional drenches of liquid manure, will be found highly beneficial. About the middle of October the roots should be laid bare, and allowed to remain so for a week, after which they should be closed in, a plentiful supply of well decayed cow-manure having been applied. A good watering to begin with will be found very beneficial. The late Captain Hollings * stated that Loquats produced in the gardens at Lucknow weighed as much as three tolas each.

The trees come into blossom twice in the year ; first, in August, when, however, they set no fruit ; and again about the end of November. The flowers are borne in erect bunches, are of a dingy white colour, and emit a delightful fragrance, somewhat like that of the Hawthorn blossom. The fruit is in season from about the middle of March till the middle of April. Besides being so excellent for the dessert, a remarkably fine preserve may be made from it.

Plants are usually propagated from seed, which should be sown immediately as it is said not to keep ; but to make certain of a good sort, it is best to obtain grafts from some tree the merit of whose fruit has been already ascertained, and not to rely upon what a seedling may chance to produce. The grafting should be done in June and July.

The Loquat rarely makes a superabundant growth of wood. Pruning, therefore, is perhaps best abstained from altogether, except it be the cutting in of the small branches that have just borne fruit. Care, however, should be taken not to shorten, on the approach of the cold season, any of the young shoots of the past season's growth, as it is from the extremities of these that flowers are always produced.

The Loquat grows to a great size in Assam. In a garden at Gowhatti a tree Firminger measured had a trunk as much as fifty inches in girth, and was correspondingly high. It seemed to be wholly unproductive. Productive up to 5,000 feet in the south.

RUBUS ROSÆFOLIUS.

MAURITIUS RASPBERRY.

This plant, a variety of which produces double, white flowers very like Roses, common in all gardens about Calcutta, is a native of Mauritius ; whence plants bearing single flowers were introduced

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* "Journal of the Agri-Hort. Society," Vol. III, p. 72.

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some little time ago. These bear fruit about the middle of February, very similar in appearance to the English Raspberry, but filled with hard seed, and having no better flavour than that of a bad Blackberry.

Easily propagated by removal of suckers, or by seed.

RABUS ALBESCENS.

MYSORE RASPBERRY.

A large-growing, straggling kind of Bramble, remarkable for the pure white kind of down, with which the young shoots are entirely covered ; native of the Nilgiri Hills and Western Ghats, where it grows wild.

The fruit, except in having a hoary appearance, is very similar to the common English Blackberry, but vastly superior in flavour. Indeed there is no fruit in the country from which more delicious tarts are made.

Though rarely met with, the plant thrives well in the neighbourhood of Calcutta. It blossoms in February, and bears fruit in March ; and by judicious attention to the cultivation can be rendered very productive.

The treatment it demands seems to be very similar to that bestowed upon the Raspberry in England. The shoots that have once borne become afterwards barren, and should be cut away completely out of the plant. Otherwise if they do not actually die, as is most commonly the case, they become aged and unsightly, and draw the nutriment of the soil from the bearing canes, to which it should be entirely directed.

It requires a good, rich soil, and a frequent renewal of it, or, perhaps, better, a complete change of ground altogether. This is best effected by raising a fresh stock of plants by digging out suckers during the rains.

In Simla and other hill stations, where it grows wild, this Raspberry is in great demand for Jams.

FRAGARIA VESCA.

STRAWBERRY.

The produce of the Strawberry in India is often very poor. Occasionally some fine-flavoured, handsome fruit are borne, not anything, however, like as large or well flavoured as are ordinarily met with in Europe. This is owing partly to indifferent cultivation, partly to climate, and largely to the character and variety of the plants themselves ; but leaving the modes of cultivation out of the question,

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it is certain that the Strawberry is grown in some parts of India much more satisfactorily than in others. In Meerut especially, and Saharunpore, the fruit is produced most abundantly; and Captain Hollings has stated that "the Strawberries produced at Lucknow are very fine, attaining to the weight of nearly a tolah each."* The neighbourhood of Calcutta, on the other hand, appears far from favourable to the growth of this delicious fruit. Bangalore produces fairly good fruit, in one or two varieties, from January till April. There the new beds are planted in August. The varieties recently established are James Veitch, Garibaldi, and Keen's seedling. The last named appears to be particularly well adapted for this country, as. Mr. Gollan writes, "it has not in the least degenerated although established at Saharunpore for 35 to 40 years."

Firminger raised the Alpine Strawberry from seed, and cultivated it in his garden at Chinsurah. He found it exceedingly vigorous in growth, and much more productive than the other kinds, to which, however, it is unquestionably very inferior. It is a long, sugar-loaf-formed fruit.

In Mahableshwar. the main hill station of the Bombay Presidency, excellent Strawberries are grown. Their only serious fault is that they are rather watery and do not stand long transit.

The time for planting out young Strawberry plants is about the beginning of October. Firminger put them out a month earlier than this, but without advancing the growth of the plants in the slightest degree. The finest fruit in England is obtained from plants of two years old. But in this country it seems all but universally agreed that young plants only of the current year's growth can be employed with success.

Having chosen a piece of ground fully exposed to the sun, dig rows of holes in it eight inches in diameter and six inches deep, the holes a foot apart, and the rows also a foot asunder. Between each third row make a small raised path ten inches wide to give access to the plants. Fill the holes with a mixture of equal parts of old cow-manure, leaf mould, and common soil, and in each put down a Strawberry plant. Water the plants at the time, and as often afterwards as they seem to require it. When they have become well established, they will perhaps begin to send out runners. These it would be well to remove, though some persons are of opinion that the doing so causes a larger development of leaves than is favourable to the productiveness of the plants. By February they will have become good large plants, and may then be expected to be in full blossom. But at this period, in the vicinity of Calcutta at least, the cultivator often meets with considerable disappointment. Sometimes the plants will expend themselves only in leaves, and produce no flowers, or will exhaust themselves in putting forth flowers in unbounded profusion, and not set a single fruit.

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* "Journal of the Agri-Hort. Society," Vol. III, p. 72.

On first observing the flowers die off without being productive, Firminger imagined they must be such as contained only stamens, or male organs, as it is well known often happens in Europe, and indeed always so with the Hautbois, which bears the male and female organs on distinct plants. But on examination he found the flowers to contain both sexual organs. Such plants as bore fruit he noticed did so invariably only on footstalks which supported but one single flower. But to what to attribute the general barrenness of the plants, that so often occurs, he altogether failed in ascertaining.

The Strawberry requires daily watering during the time of its growth and bearing. Afterwards, during the dry season, it suffers severely, and is almost sure to perish if not frequently watered. On the other hand it is not injured by moderate rains, particularly if planted on ground somewhat raised, so as to escape being flooded, but suffers from heavy rains and flooding. In Mahableshwar, the cultivators uproot the plants and keep them under shelter in beds near their houses till the rains are over. The fruit requires to be covered with a net, or protected in some other way when ripening, else it is sure to be devoured by birds. It is propagated by runners.

On the hills, where there is a winter, it is cultivated with much success, the method employed being the same as for the plains, only that the plants are planted out in February instead of October.

AMYGDALUS COMMUNIS.

ALMOND.

Badâm.

Dr. Voigt states that the Almond has been tried repeatedly in the vicinity of Calcutta, but without success. And Roxburgh observes : "it does not succeed in India, and requires much nursing to keep it alive." In the Upper Provinces, however, it is found to thrive to a certain extent, and is rather a beautiful acquisition to the garden, as much for its flowers and peculiarity of foliage, as for its fruit. At Ferozepore, Firminger sowed the kernels and two or three years afterwards gathered fruit from the plants raised from them.

It is the better plan to crack the shells before sowing the seed, in order to remove as much as possible all impediment to the germination of the kernel. Immediately upon germinating, the seed begins to send a tap-root deep down into the earth, thus rendering the plant difficult to transplant without injury. It is, therefore, best to select the spot where each tree is designed to remain permanently, and, after having prepared the soil, to sow three kernels, and if more than one germinate, to destroy all but one.

It can be cultivated on the hills with success in the same way as the Peach.

LEGUMINOSÆ.

TAMARINDUS INDICA.

TAMARIND.

Imlee.

This large tree, a native of India, and so common in all parts of the country, produces its small, yellowish blossoms in May and June, and matures its fruit in February. The varieties mentioned are :—

1. The Sour-fruited.
2. The Sweetish-fruited.
3. The Red-fruited.

The last of these, having the pulp of its pod of a rose colour, is of highest merit, and is that which, when obtainable, is always employed for preserving.

Plants are always raised from seed, but whether the varieties may be depended upon to come true to their seed, it is impossible, at present, to say. To make certain, however, of a tree of the best sort, as well as to render it of a size conveniently small for the garden, unquestionably the best plan would be to propagate a plant by means of a *gootee*. Some Indians have an idea that the Tamarind tree renders the neighbourhood of the spot where it grows unhealthy.

CASTANOSPERMUM AUSTRALE.

MORETON-BAY CHESTNUT.

A fine, evergreen tree, native of Moreton Bay, in Australia ; produces large pods, containing two or three round seeds, somewhat larger than a Chestnut. These when roasted, Don states, have somewhat the flavour of Chestnuts.

At Bangalore, Firminger was shown a fine tree in the public gardens, which, however, he found was more esteemed for its beautiful, large, orange crimson blossoms than for the fruit it yielded. The fruit, the gardener told him, no one ventured upon eating ; and not even squirrels or birds attacked it. Propagated by seed. There is a fine avenue leading up to the Cubbon Park at Bangalore. The tree grows slowly.

ANACARDIACEÆ.

MANGIFERA INDICA.

MANGO.

Am.

The Mango has been cultivated in India from remote times. It is mentioned in many of the old Sanskrit works. Excellent representations of the Mango tree are found on the Stupa of Bharhut, date 150 B.C. The early European and Chinese travellers, who visited India, and recorded their impressions, all mention it. In the time of the Dutch power on the West coast (17th century), Van Rheede wrote that the number of Mango varieties was great.

Botanically, there is in the peninsula only one species, *Mangifera indica*, of which the enormous number of varieties are but subdivisions. These varieties differ mainly in the character of the fruit. The Mango fruit has a more or less prominent beak and should be described as it lies on its side with its beak to the left. The beak is really the base of the style of the ovary. Mangoes are best classified according to shape and the following is a tentative scheme for classification :—

Class 1.—Round-fruited : with fruit whose length from stalk to apex is constantly less than the breadth.

Class 2.—Long-fruited : with fruit in which the length is constantly greater than the breadth.

Class 3.—Indefinite : those that fall in neither class.

Subordinate classes would be formed of fruit of the same characteristic shape, *e.g.*, under main Class 2 would come various sub-classes, of which one would be the *Alphonse* sub-class, characterised by a high left shoulder and a scarcely perceptible beak.

The number of varieties in India or even in any considerable part of it have never yet been figured and described. Firminger mentions the following as grown in the Calcutta Botanical Gardens in his time :—

1. *Alphonse* : from the vicinity of Bombay ; a Mango of high repute.

2. *China* : a small fruit, of little merit ; remarkable principall for the tree bearing a second crop in October.

3. *Gopâl Bhog* : from Malda ; in high estimation ; of moderate size, of a deep amber and orange colour when ripe, the flesh of livery consistency, of peculiar flavour.

4. *Kysapatee* : from Malda; a small fruit, of rich, exquisite flavour.

5. *Langra* : an excessively large fruit, of inferior quality. It remains upon the tree and ripens a month or more after the season

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of other kinds is past. Probably this is the one described by Dr. Lindley, under the name of *Dodol* or *Calappa*, as "the largest variety, sometimes being as big as an infant's head, or middling Shaddock, weighing more than two pounds ; called in Goa *Barera*."*

6. *Large Malda* : a middling-sized fruit, of an olive-green colour when ripe, the interior of a deep orange colour ; about the finest, if not the very finest, of all. To those who have not partaken of it, no words can convey an idea of the merit of this exquisitely luscious fruit. It comes into season about the 20th of May.

7. *Peter* : a moderate-sized Mango, of roundish form, with a projecting heel on one side. It ripens of a dull russet colour with a reddish tinge, and may fairly be considered of first-rate merit, having a distinct taste of a ripe Gooseberry.

8. *Singapore* : a fruit of the largest size, ripening all over of a uniform, greenish, golden yellow ; accounted by some a first-rate sort, but in Firminger's estimation of but secondary merit.

9. *Soondershaw* : a large fruit, when ripe very gorgeous in colour, of bright orange and vermilion ; in flavour only a second-rate fruit at best ; those produced in the Botanical Gardens are not even that.

Besides : 10, *Arbuthnot* and 11, *Moorshedabad*, with the merits of which Firminger was unacquainted. Firminger also says :

The following are the several kinds grown for distribution in Gardens of the Agri-Horticultural Society :—

1. *Bombay* : or large Malda.
2. *Madras* : introduced thence, but originally, from Bombay ; a moderate-sized fruit, ripens of a straw colour, and is of very fine flavour.
3. *Gopâl Bhog.*
4. *Kysapatee.*
5. *Bindobunnee* : a small egg formed fruit, of fine flavour ; green when ripe.
6. *Bhutoora* : a small fruit, of long and flattened form, ripens of a dark-green with vivid red streaks on the sunny side ; the interior of a straw colour, very delicious, having a spice of aniseed in its flavour.

Besides the following of no great merit : *Goa*, *Chuckchukeea*, and *Feroghabunnee*, from Malda. *Arracan*, *Soondershaw*, *DeCruze's Favourite*. Also *Lucknow*, *Nagroo*, *Davies* and the three, *Tarse*, *August*, and *Madame*, from Mauritius ; with the merits of all of which I am unacquainted.

The garden of Baboo Jibbon Kissen Paul, at Hooghly, contains, or did contain, in addition to many already described, a very choice selection of different kinds of Mango, of which I give an account below. I have been told, I must first state, by one who inquired about them of the Baboo, that he did not recognize the names of some.

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*"Transactions of the London Horticultural Society." Vol, V, p. 113.

All I can say is, that if I am inaccurate in any instance as to the name, I am to a certainty correct in the description of the Mango to which the name is applied. The names I took down from the Baboo's mâlee with each fruit as I received it.

1. *Archaee* (Bombay): a fruit of first-rate excellence, ripening some time after the season for other kinds is over. The tree which bears it is remarkable for the purple or inky colour of the young shoots.

2. *Bêl Mango*: a very peculiar and curious description of fruit, of a flavour in no way distinguishable from that of the fruit whose name it has; the leaf also of the tree has a strong, parsley-like scent.

3. *Bâtâvee*: a moderate-sized fruit, of first-rate excellence, when ripe of a pale Apricot colour, the flesh of a pale primrose colour; resembles closely in delicacy of flavour the "Madras" of the Agri-Horticultural Society's Gardens.

4. *Bogul*: a very large, cylindrically formed fruit, of a pale-green colour when ripe, the flesh of a butter-like consistency, and of a most delicious, Apricot-like flavour.

5. *Kuchhâee Meethea*: a fruit remarkable for being sweet and eatable in its unripe state; eaten pared like an Apple.

6. *Kâla Puhár*: a first-rate fruit.

7. *Kelooá*: a moderate-sized fruit, of orange colour, and fine gooseberry flavour.

8. *Kheera Chota* (Bombay): a first-rate fruit.

9. *Koput Bunga*: of moderate size; in colour of a pale, ashy green, with a tinge of orange on the sunny side; a most delicious fruit, second in merit only to the Malda.

10. *Mohun Bhog*: a small, red fruit, of the very highest merit.

11. *Nâreech* (Bombay): a very large, whitish coloured fruit, ripens in August.

12. *Pheeta Khâs*: flesh of a pale straw colour, very sweet and luscious.

13. *Phoolee*: a small fruit red outside; flesh of primrose colour; of exquisite flavour.

14. *Surees* or *Surees Khâs*: a long, flat-formed fruit, of moderate size; when ripe of a dark green on one side with stripes of red on the sunny side; flesh of a deep orange colour, second only to Malda in fineness of flavour.

15. *Târâh*: a fruit of moderate size, flesh orange coloured; of a fine, acid flavour.

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Besides : *Armân,* a very large, handsome fruit, in colour resembling a Nectarine, but poor in flavour, as was *Asmantârah* ; two good country kinds, *Booree* and *Chhâeton Moora* ; *Mookh-Machee, Pyâra Khâs, Shah-pusand, Soondâleea, Phreet* (Bombay)."

The following are some of the common varieties from the western side of India:

(1) *Alphonse* : (Misspelt and mispronounced *Apoos, Hapoos,* and *Afooz*) : the most delicious Mango in Western India, size moderate, skin colour pale yellow, flesh brownish yellow, left shoulder high, beak almost absent.

(2) *Pairi* : very excellent flavour, size moderate, skin colour greenish with reddish flush, flesh colour brownish yellow, shoulders falling equally, beak prominent.

(3) *Fernandin* : like *Alphonse,* but with apple-flush.

(4) *Kavasji Patel* : taste a little bitter, used for pickling, size large, skin colour pale yellow, flesh colour pale yellow, shoulders falling equally, beak prominent and downward pointing.

Cultivation.—The Mango will succeed on almost any soil in India, provided it is deep and well drained. The climate of the sea-coast suits the Mango to perfection, but inland and up to the frost line, the tree can be grown well. As it is still uncertain whether good varieties come true from seed, propagation is done by grafts, of which the simple enarch is most popular and most successful. Stocks are raised from seeds of any Mango, but it is best to give preference to seeds from strong-growing, wild, seedling trees. Budding the Mango has been a qualified success in India. Stocks of 6 months to 1 year old are used. Union is complete in 2 months after enarching. The best time for grafting is in the early rains. In planting out make pits 3′ × 3′ × 3′ at 30 feet apart each way, and treat as for standard manuring. Blossoms may appear at any time but, until the fourth year, should be plucked off as they exhaust the tree if they set fruit. From the fourth year a regular crop may be taken. There is no means of forcing the Mango to flower at any particular season. It flowers of its own accord, some time in December or January, and ripe fruits are ready in May and June. The time of flowering varies in different latitudes. When well established, say when ten years old, and enjoying a 25-inch rainfall or over, a Mango tree is absolutely independent. Up till then irrigation is needed, but thereafter none need be given. The crop varies in quality and quantity from year to year. Usually a heavy crop is got every second year.

The *Alphonse* Mango can be shipped to Europe at ordinary ship's temperatures, if the fruits are gathered half-ripe, and packed in compartments in well-ventilated boxes. There is in India a possible future for Mango-canning, provided (1) plantations are made in large contiguous blocks near a railway; (2) the necessary capital is available, especially for overseas advertising.

Pests.—Sucking insects, known in English as Mango Hoppers, and to science as *Jassidæ*, infest the flowering shoots. These produce a sticky secretion, which is seen all over the flowers and leaves, and on this a black fungus often grows. The remedy is spraying with a contact poison before the flowers open and after the fruit set. A Mango-Fly bores its way into the pulp of the fruit. Such attacked fruit must be collected and burned. A Boring Beetle attacks the trunk. When his hole with its deposit of rubbish is seen in the tree, pour tar or turpentine down and stop up the hole. A grafted tree may live for 50 years.

SPONDIAS DULCIS
OTAHEITE APPLE.
Bilâetee Umra.

A small tree, native of Otaheite and the Friendly Islands, with handsome foliage, resembling that of the ornamental Sumach of the English gardens. It blossoms, with sprays of small, yellow flowers, about the beginning of March, and ripens its fruit in August and September.

The fruit, which has a large, fibre-covered stone in the centre, is of the size and form of a large hen's egg, and of a deep amber colour, blotched for the most part with rusty russet like the colour of tarnished gold. Its appearance is very inviting; as is also its exquisite fragrance, resembling that of the Quince. To the taste, however, it is very acid, with a flavour like that of an exceedingly bad Mango.

Not much can be done with it in the way of cooking, either as a preserve or in a pudding. Don speaks of it, notwithstanding, in high commendation, and says that in its native locality it "is esteemed one of the most wholesome of fruits, and has almost the flavour of the Pine-apple; that it not only assuages thirst, but is given to the sick without distinction". He adds likewise that it has a "somewhat nauseous, fetid smell." Whence it would almost seem that the fruit grown with us cannot be that described under the same name by Don.

Young plants are usually obtained by grafting upon seedlings of *S. mangifera*, the common country *Umra.*

Cannot be grown on the hills.

SPONDIAS MANGIFERA.
HOG-PLUM.
Umra.

A coarse-looking, jungle tree, native of India, with leaves like those of the Walnut, which fall off in the cold season, when the tree remains bare and unsightly for two or three months.

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The fruit, which ripens in October, when largest is of the size of a goose's egg, of a rich, olive green, mottled with yellow and black, with but a trifling degree of scent, and none of the Quince-like odour of the other species. The inner part nearest the rind is rather acid, but that being removed, the part nearest the stone is sweet and eatable. But, withal, it is not an agreeable fruit.

It is propagated readily by sowing the stones in September.

PISTACIA VERA

PISTACHIO NUT.

Pista Badam.

The well-known nut of this tree which, when fried in butter, forms so delicious an addition to the dessert, is obtainable in great abundance in the cold weather in the bazars in most parts of India. It is not, however, the produce of this country. The nuts are imported from Afghanistan.

ANACARDIUM OCCIDENTALE.

CASHEW NUT.

Hijlee Badam—Kajoo.

The Cashew-nut tree is a native of South America. It may have been introduced and naturalised by the Portuguese. In height and general appearance it is very like the Walnut tree, but with oval, blunt, alternate leaves. The fragrant, rose-coloured flowers are borne in panicles. Major Drury states that "it grows to a large size in the Deccan, is very ornamental in leaf, and bears sweet-smelling flowers." It is also abundant in Burmah, and is of quick growth, yielding annually, after the second year, an abundant crop. It is very common on the West Coast of India, and large plantations are met with in the vicinity of Bombay. Roxburgh states that "it is found only in the vicinity of the sea, where the soil is almost perfect sand." Two or three trees were to be met in the Calcutta Botanical Gardens, where, however, they seemed to thrive indifferently, though they blossomed and bore nuts. They produce their insignificant flowers in April, and their crop in the rainy season.

Dr. Macfadyen states that "the kernel of the roasted nut is not inferior to the Sweet Almond or Pistachio nut"; and Don mentions that "the broken kernels are sometimes used for mixing with old Madeira wines. It is also an ingredient in puddings." The nuts are sold plentifully in the bazars. They are of the size and form of a small kidney, and have exceedingly thick, hard, polished shells, Between the shell and the kernel is an acrid brown oil, very difficult to remove, and which imparts to the kernels, even when roasted, a pungent taste.

Dr. Macfadyen states that the fruit, consisting of the pyriform, fleshy peduncle on which the nut is seated, when stewed with sugar or syrup forms an excellent preserve. It is also much used in native sweetmeats.

Mr. Dillwyn states that "there is a considerable difference between the East and West India nuts, and that they are probably of distinct species."* And Mr. Bates, in his description of Santarem, on the Amazon, says :

"The *Kajoo* is very abundant ; indeed some parts of the district might be called orchards of this tree, which seems to prefer sandy or gravelly soils. There appear to be several distinct species of it growing in company, to judge by the differences in the colour, flavour, and size of the fruit. This, when ripe, has the colour and figure of a Codlin Apple, but it has a singular appearance, owing to the large, kidney-shaped kernel growing outside the pulpy portion of the fruit."†

Propagated by seed sown during the rains.

Not suited for the hills. Grows up to 4,000 feet in the south.

BUCHANANIA LATIFOLIA.

Cheronjee.

A large tree, thirty feet high, with simple leathery leaves, native of the mountainous parts of Coromandel and Malabar. It produces fruit, the kernels of which are the size of small peas, and are said to be a general substitute for Almonds, and are eaten roasted with milk. Indigenous to Mysore, where it is called *Murkalimara*. The seeds are sold at rates varying from 3 to 6 annas per lb., and are more agreeable to the taste than either Cashew Nut, Country Almond, or Ground-nut.

SAPINDACEÆ.

BLIGHIA SAPIDA.

AKEE.

A large tree, native of Western Africa. The fruit is of the size and form of a small Lemon, somewhat ribbed, and when ripe of a brilliant vermillion colour. Much eaten, and held in high esteem in the West Indies. Sir J. Paxton declares it to be "not much inferior to a Nectarine in flavour." Don says that in Guinea the tree "is greatly esteemed for the excellence of its fruit, which is of a grateful sub-acid flavour." It appears, however, to be treated rather as a vegetable than as a fruit, according to the description given of it by Dr. Macfadyen, who says:—

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* Review of Rheede's "Hortus Malabaricus," p. 12.

† "The Naturalist on the River Amazon," Vol. II, p. 22.

"The fruit is brought in great abundance to the Kingstown market. The arillus, which supports the seed is the part which is eaten. It is prepared by parboiling in water with salt, and afterwards stewing or frying in butter, or by simply boiling in soup. It is very wholesome, and from its soft, rich flavour well deserves the appellation of the Vegetable Marrow."[*]

Mr. Leonard Wray also, in presenting seeds to the Agri-Horticultural Society, accompanies them with the remarks:—

"Akee, an ornamental small tree, and a delicious vegetable, sometimes eaten raw, but generally fried together with butter and black pepper."

In the Calcutta Botanical Gardens there are two trees which have grown to a great size, and in the garden of the Bankshall, at Calcutta, there is also a tree. It appears to have been somewhat scarce in India some time ago, for Dr. Gibson says of it: "The Gardens at Parel and at Dapooree can boast of the *Blighia sapida* of New Zealand, now producing fruit (at least at Dapooree) annually."[†] At Calcutta it comes into blossom in June and ripens its fruit in October.

In the public gardens at Madras were some small trees about ten feet high, which, when Firminger saw them in the month of September, looked remarkably ornamental, covered with their scarlet fruit, contrasting beautifully with the fine rich foliage, amongst which it hung. As far as he could learn by inquiry, the fruit was never eaten by any one there. Propagated by seed and *gootee*.

Cannot be grown on the hills.

NEPHELIUM LICHI.

LICHEE.

A large-growing shrub or small tree, of dense, handsome foliage, native of China. It blossoms about the middle of February, with sprays of small, pale-green flowers, and ripens its large bunches of fruit about the end of April or beginning of May. The fruit is of the size and form of a large plum, with a rough, thin, scale-like rind, which, while the fruit is hanging ripe upon the tree, is of a beautiful red tinge, but gradually becomes of a dull brown colour a short time after being gathered. The pulp of the fruit, which is as delicious perhaps as that of any fruit in existence, resembles the white of a plover's egg, and contains in its centre a stone. In the best fruit the stone is very small, comparatively ; and in this respect the fruit produced on different trees varies much.

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[*] "Flora of Jamaica," Vol. I, p. 160.

[†] Dr. Spry, "Plants for India," p. 62.

It is stated that there is only one province in China where the Lichee is grown to perfection. In the gardens, however, about Calcutta, and at Chinsurah in particular, fruit of the finest quality imaginable may be met with. The tree is also cultivated with success in the Punjab and the United Provinces, but has not seriously been taken up in Western India. Frost kills the tree.

The Chinese allow the fruit to dry till it becomes black and shrivelled, in which condition it is commonly met with for sale in the London grocers' shops.

Birds are exceedingly fond of the fruit. The trees must be protected from their ravages by having nets thrown over them from some time about the beginning of April.

At Bangalore the tree gives two crops of fruit during the year—in May and December. There are several varieties, of which some have round and others oval shaped fuit. Grafted trees soon begin to bear.

Lichees may be propagated by seed, which it is said will not keep, but must be sown at once ; but the surest way to obtain plants that will produce good fruit is to propagate by *gootee* about the end of May. The *gootee* made at that time will be ready for removing and potting off by the commencement of the cold weather, and may be planted out where it is finally to remain, in the following rainy season. It is also propagated by grafting. The trees should be put out 30 feet apart each way.

Cannot be cultivated on the hills in the north, but succeeds up to 3,500 feet in the south of India

NEPHELIUM LONGANUM.

LONGAN.

Ashphul

A tree, native of India, and cultivated in China and Cochin-China,

The fruit, which, in the vicinity of Calcutta, is produced about the end of June, is about the size and form of a marble, of a russet colour, and borne in bunches like Grapes. The fleshy part of the fruit, which resembles that of the Lichee, is sweetish, and, though not disagreeable, is vapid and vastly inferior in flavour to the lichee. The mode of cultivation is the same as for the lichee.

PIERARDIA SAPIDA.

Lutqua.

A small tree, native of Burma and Eastern Bengal.

The fruit, which, like that of the Lichee, is borne in large clusters, is said to be equal in point of merit to either the Lichee or the Loquat, which latter it resembles. Roxburgh describes it as an agreeable fruit, round, of the size of a Gooseberry, smooth and yellow, and cultivated by the Chinese under the name of *Lutqua*.

The tree abounds in Sylhet and Burma, but appears to be hardly known in Calcutta. Formerly there were fruit-bearing trees in the Calcutta Botanical Gardens, six or ten feet high, introduced from Tipperah, of the produce of which the mâlees used to speak in high praise. But these were cut down many years ago, and now none are to be found there. It is a very common tree in the district about Gauhati, in Assam. Its fruit, which it produces, in large dense bunches, in great abundance at the end of June and beginning of July, is of a roundish form, and in outward appearance bears a strong resemblance to a yellow plum. It has a dense, leathery rind, and contains, or rather is all but filled up with, three or four large seeds, each surrounded with a tough kind of pulp, which can hardly be said to be more than just moistened by the small quantity of sharp-flavoured juice it contains. In Firminger's opinion a very poor and valueless fruit: but, under good cultivation, it might possibly prove far different. Propagated by seed during the rains.

Cannot be cultivated on the hills.

AMPELIDÆ.

VITIS VINIFERA.

GRAPE.

Ungoor.

There is no doubt that Grape culture is one of the oldest of the horticultural callings. The stories in the book of Genesis show this. In Sanskrit literature there are frequent references to the Grape. In the British Museum there is an Assyrian sculpture of B.C. 726 showing a conquering army marching home and pulling Grapes from Vines overhanging a neighbouring wall.

In India there are a few notable centres of Grape culture, and all over there are attempts to grow the Vine. In these various centres of Grape culture different methods of growing and training the Vine prevail, and many of them are successful. Indeed, one may say that the Vine will stand any training or no training. Near Quetta, in Baluchistan, the Vine is grown at the bottom of deep trenches and sprawls over the sloping sides of these trenches. At Nasik, in the Deccan, the Vine is trained on a single-stake system, one Vine (a single cane) to each support (a live *Erythrina indica*). The cane is headed in at five feet from the ground and a spreading head of unsupported branches is developed. At Jeypore the Vine is trained as a low, unsupported bush. In Italy, it is often trained on overhead trellises, and this method answers well in India, as does the method of training on an upright trellis, after the Kniffin or similar systems. The Vine is exacting as to climate. It must have dry heat to produce its flowers and ripen its berries. It tolerates frost. In Afghanistan and Baluchistan it flowers in April and May and fruits in August and September. In the Deccan it flowers, or rather is made to flower, in September and October and fruits in January and February. Another flowering may take place in May and the fruit sets in August, but as this is the rainy season the fruit is bitter and useless.

The vine needs deep, well-drained soil, and loathes clay. It needs a constant manuring to keep up its fertility. In Nasik, Poudrette is used for this purpose. Various manurial combinations have been tried at the Ganeshkhind Botanical Gardens, Poona, and elsewhere, but no combination was strikingly and constantly better in its effects than the others. A generally useful formula, per bearing tree, is safflower-cake (or other oil-cake) 8 lb., bonemeal 2 lb., sulphate of potash 1 lb., applied in April yearly.

The Vine is propagated easily by cuttings of wood which has lost its greenness. The Vines should be nine inches or one foot long and should be planted in a nursery till they have developed roots, when they may be put out into the field at the distance apart suitable for the method of training proposed. For the single-stake system ten feet apart each way is ample. The Vine must be shaped from the start. In practically all systems one strong cane is developed and then its branches are trained according to desire. Having got a framework of branches the fruiting spurs are developed along these by pruning. Thus, in the single-stake system, the branches radiating from the top of the cane are productive of fruits. After fruiting, these shoots are cut back to two buds each in April. During the rains much new growth is made, and in September each branch is cut back to four buds. Of these, two or more will produce fruiting branches, and so on next year. It is necessary to thin out the Grapes so that bunches of uniformly shaped berries may be produced. The first thinning should be done, with a pair of long scissors, shortly after the fruit has set, and a second thinning when the fruits are half grown. Bunches not thinned are crowded and the berries damage each other.

The most formidable enemy of the vine and its fruit is mildew caused by the fungus *Oidium*. The floury material on the surface of leaves and berries in this disease is a mass of spores. One remedy is Bordeaux mixture full strength before the berries set, and half strength for spraying the berries. An alternative remedy is sulphur, in very fine dust, applied by a dusting machine. Anthracnose, a disease due to the fungus *Glæosporium ampelophagum* and showing itself as sunk black patches on stems, leaves and berries, is another enemy of the Vine, specially bad in wet weather. The remedy is to wash down the Vine with a solution of iron sulphate, when the tree is pruned. An insect called *Scelodonta strigicollis* is a pest in Nasik, eating the young buds. It is caught in bunches of Plantain fibre placed on the tree and then burned.

There are many varieties of Grapes. In Quetta the *Haita* (long, green) and *Kismis* or *Bedana* (small, seedless) are best known. In Nasik the *Bhokri* (round, green), *Fakadi* (oval, green), and *Sahebi* long, green) are found. Purple varieties called *Kali* (Black) are found all over.

RHAMNEÆ.

ZIZYPHUS VULGARIS.

LONG PLUM—ROUND PLUM.

Paivandee Bâer—Kool-Phul.

A small thorny tree; native of Syria and the Levant: common about Calcutta and in most parts of Upper and Central India. Comes into blossom towards the end of September, bearing small, greenish-white flowers, and ripens its fruit towards the end of January.

The fruit has a thin, pale-green, smooth rind like that of an Apple, and bears a stone in the centre. Between the stone and the rind is a pleasant crisp, refreshing substance like that of a juicy Apple, but with no very marked flavour. Dr. Hogg, in his report on the Paris International Exhibition of 1867, states: "This is sold in Covent Garden Market under the name of Japonicas, with what reason it is impossible to tell. It is from this fruit that the confection called *jujubes* receives its name, and which should consist of gum arabic and sugar dissolved in the decoction of the fruit and then evaporated to its proper consistence; but as made in England the fruit forms no part of the ingredients."

There are several varieties; one is of the form and size of a swan's-egg Plum, another is of the same size, but round. The tree that bears the oval fruit has oval leaves, and the one that bears the round fruit round ones. The tree is of the most rapid growth; immediately after it has produced its crop of fruit, it is the custom of the mâlees to prune it severely, and to cut in branches even those are nearly as thick as a man's wrist.

Plants are propagated by grafting or budding. "Trees," says General Jenkins, "may be grafted in several ways, but the usual process in Bengal is by ingrafting a ring of bark about one inch long on stocks of the common *Bâer*. The ring is to have one eye, and to

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be soaked some time in water after being drawn off, and then placed upon the stock intended, and from which the bark has been cut off in size equal to the ring to be fitted on. Protect from the weather, and cut away all other branches from the common *Bâer*." *

Not cultivated on the hills.

ZIZYPHUS JUJUBA.

Bêr—Narikelee Kool.

A small, very thorny tree ; native of India ; blossoms in the rains and ripens its fruit at the beginning of the cold season.

The fruit, which is usually bored upon the tree in unbounded profusion, is perfectly round, of the size of a very large Cherry, smooth, shining, and of a tawny yellow colour ; rather acid in flavour, and not altogether unlike a Siberian Crab-apple. It affords a very nice dish cooked with sugar.

The tree of this likewise is of extraordinarily rapid growth ; cut down to the ground after fruiting, it will spring up again to the height of fifteen feet, and be covered with an amazing crop of fruit, the following season.

Propagated from seed, and requires no care bestowed on its cultivation.

Not cultivated on the hills, except in the south, where the fruit is comparatively poor.

HOVENIA DULCIS.

A large tree ; native of China, Japan, and the hills of Northern India.

Don and Dr. Lindley state that the peduncles of the fruit become extremely enlarged and succulent, sub-cylindrical, smooth, and an inch long ; contain a sweet, red pulp, having in flavour much the resemblance of a ripe Pear, and is in much esteem in China.

Firminger states that the tree had been a great many years in the Calcutta Botanical Gardens ; but had never produced anything there fit to be eaten in the way of fruit. Propagated by seed and cuttings.

Not cultivated in gardens on the hills, although common enough as a jungle tree.

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* "Our Tropical Possessions in Malayan India," by J. Cameron, Appendix I.

MELIACEÆ.

LANSIUM DOMESTICUM.

LANGSAT OR LANSEH.

Native of Java and of the Moluccas.

Mr. Low in his work on Borneo describes the fruit of this tree as "pulpy, aromatic, and delicate, produced in bunches, from the stem and branches of the tree." And Dr. Ward says of it: "This delightful fruit is the produce of a large tree. It grows in clusters; each is about the size of a cricket-ball. The brownish, thin skin being broken displays the pulp in six cloves, of a pleasantly acid taste, enclosing a greenish, kidney-shaped seed. It is by many reckoned the finest fruit in the Peninsula. The month of July is the season at Malacca in which it is had in greatest perfection." ★ Dr. Voigt mentions the plant as existing in the Calcutta Botanical Gardens, but doubts whether it has ever flowered. Firminger understood from the mâlees that two trees were growing there in Dr. Wallich's time which bore fruit abundantly, but that they died long since. Dr. G. King, writing in 1888, says: "It is in good health, but does not flower."

RUTACEÆ.

TRIPHASIA TRIFOLIATA.

Cheena Narunga.

A small, unpretending, thorny shrub, native of China; bears small, white, fragrant flowers. The fruit, which is spoken highly of by some authors, both in respect of its flavour and its excellence for preserving, is about the size of a large black Currant. It encloses a stone, which fills nearly the whole of the centre, leaving room for a small quantity of juicy pulp of an agreeable, aniseed-like flavour. It can, notwithstanding, be hardly regarded as better than a mere berry. The plant, which is almost constantly bearing, produces its crop principally in February, when the bright red fruit gives it rather a pretty appearance. It may be propagated either by seed or by cuttings put down in February.

May be grown on the hills in a green-house.

COOKIA PUNCTATA.

WAMPEE.

A small tree, native of China; rises to about twenty feet in height; is of rather handsome growth, with fine luxuriant foliage;

★ "Our Tropical Possessions in Malayan India," by J. Cameron, Appendix I.

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blossoms in the early part of April with small dense bunches of whitish, sweet-scented flowers, and ripens its fruit in June. The fruit is borne in clusters, and when ripe resembles a diminutive Lemon, being about the size of an acorn, with a rough, Orange-like rind. It contains three large seeds, which nearly fill the interior. The small quantity of juicy pulp between the seeds and the rind is of an aniseed-like flovour. In the vicinity of Calcutta, where the tree is not uncommon, the fruit can hardly be considered better than a poor, unserviceable berry. Possibly in China, and in other localities more congenial to it, a more palatable fruit may be produced.

According to Firminger a variety is met with in some gardens in Bengal, but not commonly which bears a fruit of quite a dark colour and of much superior quality to the green kind.

Plants may be propagated from seed or by cuttings put down in the rains. They grow well in all parts of the plains of India.

Cannot be cultivated on the hills.

FERONIA ELEPHANTUM.

WOOD-APPLE—ELEPHANT-APPLE

Kaitha—Kuth-bêl—Karath.

A common jungle tree of this country. The fruit is round, of a pale-green colour, and about the size of a cricket-ball. When the hard shell-like rind is cracked, the interior if found full of a brown, soft, mealy kind of substance, rather acrid, having a strong smell of rancid butter, and by no means palatable. It ripens in October. Dr. Wight says: "The pulp of the fruit affords a very pleasant jelly, so closely resembling black Currant jelly, as to be only distinguished by a trifling degree of astringency." The jelly, however, which Firminger prepared from it appeared to him to possess rather the flavour of Apple, with a sharp, cider taste, and to be such as would not likely be approved of by many.

The tree may be propagated by seed or by cuttings put down in the rains, but it is not entitled to a place in the garden.

Not grown on the hills.

ÆGLE MARMELOS.

BAEL-FRUIT—BENGAL QUINCE.

Bél-phul.

A small tree, much covered with sharp spines, native of this country, and common in most parts of India.

The fruit varies much as to size. The largest are sometimes seen bigger than a man's head, while those of the ordinary size are not much larger than a cricket-ball ; the very large ones, however, are considered of not nearly so good a quality as those of a more moderate size. The rind consists of a thin, pale-green shell, which it requires considerable force to crack. The interior contains a soft, yellow substance of peas-pudding-like consistency, intermingled with a limpid kind of slime, of a very fragrant scent, and of a flavour very agreeable to those accustomed to it. The high reputation it bears for its medicinal properties induces many to partake of it, and those who do so usually become remarkably fond of it. It is in season principally during the months of January and February in Bengal and a month later in Upper India.

The tree may be propagated either by layers or by seed put down during the rains. No trouble is ever taken to improve it by cultivation.

Not grown on the hills.

CITRUS AURANTIUM.

ORANGE.

Kumla Neeboo.

Narungee—Sungtura.

The classification of the species contained in the genus *Citrus* is still in a somewhat unsatisfactory condition. We can, however, with fair clearness, distinguish *Citrus aurantium*—the Orange ; *Citrus decumana*—the Pomelo ; and *Citrus medica*—a species including the Citron, the Lime, and the Lemon. Since Bonavia's "The Oranges and Lemons of India and Ceylon" there has been no comprehensive study, of the Citrus species of India. Bonavia's book is unfortunately ill-arranged and unscientific. A new study is required of these important fruits.

Citrus Aurantium.

The following Oranges are found cultivated in India:—

(1) In the Khasia Hills, the Sylhet Orange, a round, plump, thin-skinned fruit, propagated by seeds.

(2) In Coorg, a loose-skinned variety, propagation unknown.

(3) At Nagpur, also near Poona, and in several parts of the Deccan, a loose-skinned Orange of the Mandarin type called the *Santra* or *Sungtura*.

(4) At various places in the Deccan, a tight-skinned Orange of the Malta type, called the *Mosambi* (a corruption of Mozambique). This is generally called the Sweet Lime by Europeans.

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(5), (6) and (7) At various places in the Deccan, the *Ladu* Orange (shaped like a semi-flattened balloon), the *Kowla* Orange (rough-skinned with a mammilla) and the *Reshmi* (a worthless, deep red-skinned fruit).

(8) The *Jamaica* orange (a large, tight-skinned fruit) is found here and there.

(9) *Navel* Orange varieties are grown experimentally in several public gardens.

The general method of propagation for all Oranges except (1) and (2) is to bud them on some stock. In the Deccan, a variety of *Citrus medica* known as *Jamburi* is employed, as it gives strong, well-shaped trees. In the North-West Frontier Province, similar stocks known as *Khatta* and *Khatti* are employed. Other stocks *can* be used but are not so successful. The one giving results next best to *Jamburi* is the *Citron*. Seeds of the Jamburi should be sown one foot apart in well-manured beds and budded on when of the thickness of a lead pencil. The T method is best and the bud should be inserted about six inches from the ground. Budding may be done at any time provided the stock is in active growth and that budwood, with the buds just swelling, is available. Six weeks after budding the stock is beheaded, and six months to a year after budding the plant can be transplanted to its final position in the field, at twenty feet apart each way. In the dry season the plants must be watered once every ten days. Green manuring should be done in the rains, and manuring as for other fruit trees during the trees' lifetime. Pruning for shape must be done in the first four years. The *Santra* tends to shoot up into a straight broom-shape and must be converted into an open urn-shape. The *Mosambi* is of a drooping spreading habit and must be trained to an open flat-topped, broad, low tree. Flowers and fruits appear usually in the fifth year. It is a common practice in the Deccan to force flowering at a particular season by withholding water and exposing the roots for a time. This checks the trees' vegetative growth and is believed to cause flowering. In several cases, however, it has proved ineffective, and it seriously damages the trees. It is better to wait the trees' pleasure, reducing water, certainly, but not exposing roots. Flowers may appear in January, June, or September and fruits are ready ten months after flowering. If exposed to direct sun the fruits scorch and should be protected by paper covers if in danger of exposure. The fruits may be gathered when only partially coloured, and ripened in store. Flower and fruits are always borne on what the Americans term the *fruiting brush*, which means the thin, hard wiry stems occuring in a brush-like mass near the outer ends of stronger branches. Reckless pruning of a tree cuts away this fruiting brush. After the shaping of the tree, pruning should be confined to thinning out superfluous and dead branches.

Orange trees suffer from several diseases which we may class as (1) physiological, (2) fungoid, (3) insect. Of the physiological diseases the most deadly is that known as *dieback*, so called from the dying-off of twigs. The *Santra* suffers most from this. It appears to be due to bad soil conditions, especially to over-watering and lack of aeration, and also, curiously enough, to drought and heat. Preventive measures are good cultivation and copious, well-timed watering. Digging trenches to effect subsoil drainage has proved an effective remedy in heavy soils. The only fungoid disease of importance is *collar-rot* due to *Fusarium limonis*, a soil fungus attacking the stem at the *collar*, *i.e.*, the part at ground level. Affected trees srould have the diseased part cut out and the wound painted with 50 per cent crude carbolic acid. Water should not be given so as to touch the trunk. A disease that is possibly of fungoid origin is *scab*. This appears as brown, warty excrescences on stem, leaf, and fruit. Spraying with Bordeaux mixture is recommended against this. Of insect diseases, the most serious is the fruit-puncturing moth, *Ophideris fullonica*, which flies by night and sucks the juice of the nearly-ripe fruits. In the morning a yellow spot with a pinhole in it is noticed on the fruit and by evening the fruit has fallen. The remedy is to catch these moths at night by hand and net. A boring insect occasionally attacks the trunks, but its ravages can be detected early, the animal killed with a wire, and the hole plunged with tar.

Oranges do not tolerate continued frost. A dry season is necessary for the ripening of the fruits. Light soil, especially alluvium, with plenty of chalk in it, seems to suit them best. They will grow in districts of no rainfall up to 100 inches or over, but if rainfall is absent, they must have liberal irrigation. In some districts it is necessary to protect the young stems with newspaper cylinders against the sun, otherwise the bark scorches and cracks.

The cultivation is a profitable one, and a well-cared-for tree may live for thirty years. Its best bearing years are generally the fifth to the fifteenth.

CITRUS DECUMANA.

PUMELO—POMPOLEON—POMPELMOSE.

Batávee Neebo—Chukotura.

This is a species well marked in appearance and in physiological characters. The leaves are large and broad, with broad winged petiole. The tree is of a spreading habit, with rank succulent growth. The fruit is a magnified Orange weighing several pounds. The tree tolerates heavy rainfall. It grows to perfection on the Bombay coast, and it seldom shows dieback. The term grape-fruit has been given to smaller varieties, and Shaddock to large coarse varieties. Botanically these are one species. Of the Pomelo, as we know it in India, there are two distinct types—the white-fleshed and red-fleshed, and these may have seeds or be seedless. Individual trees differ much as to shape and flavour of fruit. There is an excellent chance here for a keen horticulturist to select, name, propagate and sell reliable variety. The tree is easily propagated by *gootee* (marcotte) and can also be budded on the Jamburi and Citron stocks. Its general treatment is that of the Orange, and its enemies are the same. Pomelo fruits while on the tree should be protected from the sun by thick paper hoods, otherwise they get badly scorched on the exposed side.

CITRUS JAPONICA.

KUMQUAT—OTAHEITE ORANGE.

A small tree, native of China, of recent introduction into India. The fruit resembles a diminutive Orange, about the size of a Lichee, and is produced in great profusion during the cold months, rendering the tree upon which it is borne an exceedingly ornamental object in the garden. A very fine preserve is made from it by the Chinese. It may be propagated by layers or seed. But Mr. Fortune observes, "in order to succeed with it as well as the Chinese do, one little fact should be kept in view, *viz.*, that all the plants of the Orange tribe which bear fruit in a small state are grafted."* It should be cultivated the same as the Orange.

Not grown on the hills.

CITRUS MEDICA var ACIDA

LIME.

Khutta Neeboo.

Firminger states : "Of the Lime there are several varieties, but it is hardly worth while, especially where the Lemon is also cultivated to allow room for more than two or three of them in the garden. The trees are the least ornamental, and the flowers the meanest and least possessed of scent of any of the Citrus genus.

1. *Pâtee* : a small fruit, esteemed by the natives, highest of any.

2. *Kâghuzee* : of the size and form of a hen's egg ; ripens of a pale Lemon colour, the one perhaps in most general cultivation of all.

3. *Gora* : a small oval fruit, much cultivated.

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*"Tea Districts," p. 122.

4. *Cheenee Gora* : a sub-variety of the previous one, and reckoned superior to it ; of the size of a large Orange, thin-skinned and fine-flavoured.

5. *Kamuralee* · a large handsome fruit, of pale Lemon colour, and of about the size of a Cocoanut.

Besides the above, Dr. Voigt describes the following three, with the merits of which I am unacquainted:—

6. *Rungpore* : a round, smooth-skinned fruit.

7. *Taba* : a large, globose, spongy-skinned fruit.

8. *Arabian* : a large, thick-skinned sort.

9. A very pretty variety, growing in Baboo Jibon Kissen Paul's garden at Hooghly, bears perfectly round Lemon-coloured fruits, in size little larger than a marble.

10. A variety in the same garden bearing fruit of the form of a Nutmeg, and but little larger. These two varieties I understood were introduced originally by Mr. F. Pereira from China.

The Lime is easily propagated by layers or by sowing the pips. Varieties, such as the two last, are perhaps best budded or grafted on stocks of some kind of stronger habit."

It is apparent that in the list given above there are many fruits of different kinds, and that both Lime and Lemon are represented. Limes and Lemons are constantly being confused. The distinctions between Lemon, *Citrus medica* var. *limonum* ; the Sour Lime of India, *Citrus medica* var. *acida,* and Sweet Lime of India, *Citrus medica* var. *limetta* are:—

1. *Citrus medica* var. *limonum* : a small thorny tree, ten to twenty feet tall, leaves not winged at the petiole, flowers one and-a-half to two inches across, solitary, occasionally in pairs, fruit ovoid or oblong and pointed at both ends. Pulp acid.

2. *Citrus medica* var : *acida* : a thorny shrub or small tree, five to ten feet high ; leaves slightly winged at the petiole, flowers small (½-inch across), in axillary clusters of three to ten, fruit round one to one and-a-half inches across, smooth or wrinkled. Pulp acid.

3. *Citrus medica* var. *limetta* : like (2), but with a fruit three to five inches across, rind thin and smooth, pulp sweet. Thorns smaller than in (2).

Cultivation as for Orange. All can be propagated by seeds or budding.

Firminger's remarks regarding the Lemon are as follows:—

"The varieties of Lemon grown for distribution in the Gardens of the Agri-Horticultural Society are :—

1. The common Spanish so much used in England. This is not altogether similar in shape to the European fruit. The tree is very valuable for being in constant bearing all the year through.

2. *Burton's* peculiar for the large beak with which the fruit terminates.

3. The (so-called) large Lemon.

4. The *Ningpo* : plants and seeds of this were sent in the year 1854 by Mr. Fortune from China, with the following remarks : *

'I draw your attention more particularly to the Ningpo Lemon, a fruit which is much esteemed by the Chinese on account of its fragrance. In the autumn, when this fruit ripens, it is met with in all the houses of the rich. An ornamental plate of old China, on a stand, is filled with the fruit piled one above another, and placed upon a table in the hall or reception room ; here it remains for several weeks, and diffuses a delicious perfume throughout the house.'

The plants sent by Mr. Fortune do not appear to have fruited satisfactorily since they have been introduced.

Plants of all varieties of the Lemon may be raised from pips or by layering."

CITRUS MEDICA. *variety proper.*

CITRON.

Beg-Poora.

The fruit of this tree is well known for its great size, as well as for its dense, spongy rind, from the external portion of which such excellent preserve or marmalade is made ; the leaves are peculiar in not having, like most of the Citrus genus, winged footstalks. There are three well-distinguished varieties met with in this country. The fruits all terminate in a blunt-pointed beak.

1. The Common Citron, of the size of an ostrich egg, or somewhat larger, much knobbed and warted.

2. A Citron of enormous size, fully a foot or more long. This seemingly is the kind known in Europe as the Poncire.

3. The fingered Citron, a curious fruit, resembling a man's hand with the fingers bent up with cramp ; not uncommon in the North-West Provinces. It has been stated that the rind of this variety is very fragrant, and that the Chinese place it on dishes in their apartments to perfume the air. In Indo-China it is known as *Main-de-Bouddha* (Hand of Buddha) by the French and *Phat-tu* in the Cochin-Chinese language. It is an undoubtedly abnormal form in which the carpels partly separate. A similar abnormality is frequently observed in Papaya fruits.

The Citron is usually propagated by seed and layering.

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* "Agri-Hort. Soc. Journal," Vol. IX, p. 100.

In Assam a curious plan is adopted to bring the Citron to perfection. When the fruit is as yet but small, the branch that bears it is bent down so that the fruit may be lowered into a large earthen vessel with narrow aperture, sunk for the purpose in the ground. The fruit which, the natives say, if left in its natural position on the tree would never become large, confined in that situation grows to a prodigious size, and completely fills the vessel. When extracted from the vessel, which of course must needs then be broken, it diffuses a wondrous perfume.

GERANIACEÆ.

AVERRHOA CARAMBOLA.

Kumrunga.

A small tree, native of Moluccas ; common in most parts of India ; grows to the height of from fourteen to twenty feet ; very beautiful and ornamtntal for its foliage alone, but especially so when in full blossom, with the crowded clusters of its small pale, rose-coloured, ribes-like flowers. Dr. Bruce states that its leaves are sensitive, and even its branches.

The fruit is remarkably handsome of the size of a Lemon, deeply ribbed or winged ; when perfectly ripe, semi-transparent and of a fine, rich, amber colour. Previous to becoming quite ripe it possesses a flavour somewhat between that of Sorrel and a green Gooseberry. When well ripened it has a very strong and agreeable scent, as nearly as possible like that of the Quince, as well as a very fine and peculiar flavour. It has, however, even then a degree of acidity which renders it hardly fit to be eaten raw. It does not bear cooking well, as it then becomes tough and horny ; but when the tough part of the fruit is removed, the pulp affords a very delicious jelly. The fruit ripens towards the end of September, at which time the tree comes again into full blossom, and produces a second crop of fruit in January. Flowers may be produced in February again. It is propagated from seed.

Cheenee Kumrunga.

A variety of the above ; bears a fruit smaller by about half, when ripe of a deep-green colour, and not nearly so handsome ; without the acidity of the ordinary kind, but also entirely without its fine flavour. This is always propagated by grafting upon stocks of the other.

Neither of the above can be cultivated on the hills, except in the south, where they succeed up to 5,000 feet.

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AVERRHOA BILIMBI.

BLIMBING—CUCUMBER TREE.

Bilimbee.

A small tree, native of Moluccas ; found in the Deccan, but not often met with in Bengal. It has rather a stout trunk, and grows to about thirty feet in height. It comes into blossom about the middle of February, with pretty ribes-like bunches of flowers, and continues to blossom and bear fruit till the cold weather. The fruit is of the form and size of a Gherkin, with a smooth, thin, pale-green, translucent rind, like that of the White Grape. When ripe it is as soft as butter, and has somewhat of the flavour of an unripe Gooseberry, too acid to be eaten, except when cooked or pickled. When laid by a short time, it acquires the scent of Strawberries, without however possessing in the slightest degree their flavour. It makes a very agreeable preserve. The way in which the fruit is borne on the tree is very singular, hanging merely by slight, thread-like footstalks, in clusters of eight or ten, from the oldest branches, but principally from the trunk itself.

Cannot be grown on the hills of Northern India.

MALPIGHIACEÆ.

MALPIGHIA GLABRA.

BARBADOES CHERRY.

Sir R. Schomburgh says :—

"The fruit is much used in Barbadoes in preserves and tarts, and there is something in the taste that reminds one rather of the Raspberry than of the Cherry............It bears eatable fruit, in appearance and size resembling Mayduke Cherries, but, though juicy and sweet, in every respect inferior to M. urens : the fruit of this may be likened to common wild Cherries of our plantations." *

Both the above species are very common in the gardens about Calcutta, thriving well and forming very handsome flowering shrubs. M. glabra bears in the cold season a few scattered bright-red fruits somewhat like Mayduke Cherries, it is true, but very small ones, such as Firminger tasted and found to be mere worthless berries, pithy, tasteless, and juiceless.

Propagated by cuttings put down in October.

Cannot be cultivated on the hills, except as an ornamental shrub in the glass-house.

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* "Paxton's Flower Garden," II, 18.

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TILIACEÆ.

GREWIA ASIATICA.

Phâlsa.

A coarse-looking, unattractive shrub, somewhat resembling the Hazel in foliage, native of India, and common in some parts of the country, *e.g.*, near Ahmedabad.

The fruit is a berry about the size of a Pea, with a stone in the centre, sour and uneatable, but a sherbet made from it is considered agreeable by some. The fruit is produced during the hot months. It needs no particular cultivation, and is easily propagated from cuttings and seeds put down in the rains. After the fruits are picked, the branches should be cut back to a foot long, as the flowers and fruits appear on the new shoots formed in the rains.

GREWIA SAPIDA.

This also, like the last, produces during the hot season its crop of berries, sometimes used for making sherbet.

Neither of the above can be cultivated on the hills.

STERCULIACEÆ.

ADANSONIA DIGITATA.

BAOBAB—MONKEY BREAD.

Bildelee Imlee.

It Senegal, its native locality, this grows to become one of the largest trees in existence; but the trunk, even in small trees, has an inflated, gouty appearance, due to the presence of water-storing tissue.

The fruit is a woody capsule, pointed at the ends, with a thick, woody skin and a pulp in which hard seeds are embedded. The pulp contains starch, sugar, and other matters, and rapidly ferments and acidifies. The tree is of African origin. The specimens found on the west coast of India are probably from seeds brought long ago by African traders, and by the Abyssinians who fought for the Mahrattas.

DURIO ZIBETHINUS.

DURIAN—CIVET-CAT FRUIT.

A large forest-tree, growing to the height of eighty feet, is a native of Malay, and thrives well in Burma and the Straits, also in Ceylon.

The fruit is about the size of a man's head, within which is the seed, with its edible, enveloping pulp, of about the size of a hen's egg. The pulp is pure white, resembling blanc-mange, and as delicious in taste as the finest cream. The bulk of the fruit, however, in which this creamy pulp is enclosed, is intolerably offensive, having the smell of putrid animal substance, or rotten onions. The seeds, when roasted, are said to have the flavour of Chestnuts.

Plants have repeatedly been introduced into the gardens about Calcutta, but they have never risen to more than about three feet in height, when they have uniformly died off, the climate of that latitude being quite unsuited to them. In his annual report for 1900-1901, Mr. R. L. Proudlock, Curator, Government Botanical Gardens, Ootacamund, writes as follows :—"The Durian plants raised from seed received on the 26th August 1898, from the Royal Botanic Gardens, Peradeniya, are doing well, the best being six feet ten inches in height when measured on the 22nd March 1901."

The results quoted above are in the experimental garden at Burliyar which is situated near the south-eastern base of the Nilgiri mountains, at an elevation of 2,500 feet. The Mangosteen and Litchee fruits have succeeded better in this garden than in any other part of India.

STERCULIA BALANGHAS.

CHINA CHESTNUT.

This tree is a native of India, and produces seeds which Roxburgh states, when roasted, are nearly as palatable as Chestnuts. In Roxburgh's time trees of large size were in existence in the Calcutta Botanical Gardens, but these have been removed and only small plants are now to be met with there.

Propagated by seed sown in October.

MALVACEÆ.

HIBISCUS SABDARIFFA.

ROSELLE—INDIAN SORREL.

Putwa—Mesta.

An annual, native of the West Indies, but now cultivated in most gardens in India.

The part of the plant made use of is not the fruit itself, but the large, thick, succulent sepals which envelop it. Of these most delicious puddings and tarts are made as well as a remarkably fine jelly hardly to be distinguished from that of the Red Currant, for which in every respect it forms an excellent substitute.

There are two kinds, the red and white, much the same except that the white seems a trifling degree less acid.

GSL

The seeds the sown about the end of May, and the plants are put out in the ground at the distance of four feet from each other. It grows to the height of three or four feet, and bears a large, handsome yellow flower, with a dark crimson eye. The secret of success is to gather the sepals while they are soft and juicy, *i.e.*, as soon as the fruit is set and before the fruit develops.

In Ferozepore, Firminger found the full-grown plants very apt to perish before coming into bearing.

Cannot be cultivated on the hills. In the Deccan it is very easy to cultivate, requiring no attention.

GUTTIFERÆ.

MAMMEA AMERICANA.

MAMMEE-APPLE.

A large timber-tree, native of the West Indies.

The fruit Dr. Lindley mentions as "the wild Apricot of South America, said to rival the Mangosteen." It is described as "Yellow, not unlike, either in shape or size, one of the largest russet Apples. The outer rind, which easily peels off, is thick and leathery ; beneath this is a second very delicate coat, which adheres closely to the pulp, and should be carefully removed before eating the fruit, as it leaves a bitter taste in the mouth. The seeds of which there are two or three in the centre, are resinous and very bitter ; but the pulp under the skin, which, when ripe, is of a deep yellow, resembling that of the finest Apricot, and of considerable consistency, is very fragrant and has a delicious but very peculiar flavour. It is eaten either raw and alone or cut into slices with wine and sugar, or preserved in syrup."

Dr. Macfadyen describes it as "of a sweetish aromatic taste, bearing a resemblance to that of a Carrot."

It was introduced into the Calcutta Botanical Gardens very many years ago, where in Dr. King's time it grew well, and yielded a plentiful crop of fruit annually.

GARCINIA MANGOSTANA.

MANGOSTEEN.

The Mangosteen is a native of the Malay Islands. It is of limited distribution and is a thoroughly tropical plant, growing to perfection from the equator to 6° north and south.

The plant seems to prefer an elevated alluvial, ferruginous soil, well drained, with plenty of humus. The atmosphere should be moist. Flowering and fruiting times vary with the site of the plantation.

CSL

The fruit is held in the very highest estimation. Don declares it to be "in flavour the most delicious fruit in the world, partaking of the Strawberry and the Grape." It is said that to taste the fruit in perfection it must be eaten as it is gathered from the tree. The specimens brought occasionally to Calcutta from the Straits are of the size of a middling-sized Apple, perfectly smooth, with a dense rind, which, when removed, reveals the centre of a soft, white, pellucid, most agreeable plup. But these convey hardly a notion of the fine flavour of the fruit when gathered fresh. The cultivation of the Mangosteen, in the open air at least, as far north as any part of Bengal seems now pretty well decided to be impracticable. Plants have been repeatedly introduced into the gardens about Calcutta, but have never been known to yield fruit. Mr. R. Solano, notwithstanding, assured Firminger that he had in his garden at Shahabad three trees, about six feet high, and that one of these had borne fruit two years in succession.

Propagated by *gootee*.

Cannot be cultivated on the hills in the north, but succeeds at 2,500 feet in the south.

Delicious fruit is produced in the Burliyar Experimental Garden near the south-eastern base of the Nilgiri range.

GARCINIA COWA.

COWA—COWA-MANGOSTEEN.

A very handsome tree, with fine, luxuriant foliage, of large laurel-formed leaves ; native of Southern India.

The fruit ripens at the beginning of June, and is of the size and form of a small Orange, ribbed, and of a russet-apricot colour ; and were it not a trifling degree too acid, would be accounted most delicious. It makes, however, a remarkably fine preserve.

Plants are raised easily by sowing the fibre-covered stones with which the centre of the fruit abounds.

Cannot be cultivated on the northern hills.

NELUMBIUM SPECIOSUM.

Toomul.

A fine, handsome tree from thirty to forty feet high, native of this country ; bears in April rather large, white flowers.

The fruit is remarkably handsome and alluring, of the size and form of an Orange, but with surface perfectly smooth like that of a Plum, and of a bright yellow colour. If it were possible by cultivation to subdue its intolerable acidity, it would rank in merit, Firminger considers, with any fruit grown. Don says, "It is not inferior to many Apples, but I see no point of similarity in it to suggest such a comparison. The greatest degree of acidity resides in the thick, fleshy rind. The pulpy part in which the seeds are enclosed is less acid, but very acid still ; indeed so much so as to put any one's teeth out of order for a day or two after having partaken of it. Underlying this intense acidity, however, is a fine flavour, resembling, as I think, that of the Apricot. The fruit begins to ripen about the middle of September, when, if not protected, it is greedily devoured by flying-foxes."

Propagated by seed sown during the rains.

Firminger endeavoured to make a preserve of it, thinking that the acidity might be so far overcome by cooking as to render it agreeable to the palate. But he found that the resinous property with which it abounded made it then quite unfit for eating. This is one of the prettiest evergreen trees in the province of Coorg, where it occupies a range mostly between 3,000 and 4,000 feet. It grows into a perfect cone, and is strikingly effective and beautiful when in fruit. The latter is occasionally used in lieu of Tamarind, but is considered bilious. It also ruins the teeth.

Known in Coorg as *Divarige* and *Vale-mara*.

Cannot be cultivated on the hills, except in the south of India, where it is a hill tree.

CALYSACCION LONGIFOLIUM.

(OCHROCARPUS LONGIFOLIUS.)

Woondee—Suringee—Soorgee.

A small tree, remarkable for its fine, handsome, dense, laurel-like foliage, said to be frequently met with in the Deccan of India, though hardly known in Bengal, except by some two or three thriving specimens in the vicinity of Calcutta.

The fruit is about the size of an Acorn, to which also it is very similar in appearance. It encloses a large stone, between which and the rind is a soft, pulpy juice of rosewater-like flavour, considered very agreeable by some. It is not, however, accounted an edible fruit. It ripens about the middle or end of May.

Easily propagated by sowing the stones in June and July.

Cannot be cultivated on the hills, except in the south.

NYMPHÆACEÆ.

NELUMBIUM SPECIOSUM.

LOTUS—SACRED OR EGYPTIAN BEAN.

Kunwul.

This beautiful Water-lily is a common plant in the tanks of Bengal, as well as in other parts of India. It displays its handsome

Pæony-like flowers during the hot and rainy seasons, and at the beginning of the cold season ripens its seeds in curious, drooping, cone-shaped capsules.

Sir E. Tennent says:—

"In China and some parts of India the black seeds of these plants, which are not unlike little Acorns in shape, are served at table in place of Almonds, which they are said to resemble, but with a superior delicacy of flavour. I tasted the seeds in Ceylon and found them delicately flavoured, not unlike the kernel of the Pine cone of the Apennines. This has clearly no identity with the fruit which Herodotus describes as the food of Lotophagi of Egypt."[*]

On this point Dr. Lindley states:—"The Lote-bush, which gave its name to the ancient Lotophagi, is to this day collected for food by the Arabs of Barbary. It is the Zizyphus Lotus of the botanists."[†]

In their unripe state the nuts of the Sacred Bean are eaten raw, when to Firminger they seemed to have much of the flavour and crispness of filberts. On ripening they become hard, and are then roasted before eaten.

ANONACEÆ.

ANONA SQUAMOSA.

CUSTARD-APPLE.

Ata—Shureefa—Seeta-phul.

A small tree; "no doubt," Dr. Voigt observes, "a native of tropical America, notwithstanding St. Hilaire's reasonings, which would make it of Asiatic origin." It is abundant in Bengal and widely cultivated in the peninsula. Flowers begin to appear in April and ripe fruits in August. The fruiting season may last till end of November, and stray fruits are available all through rains and cold weather. Research is required on the pollination and fruiting of this tree, as it often produces flowers which fail to set fruit.

The fruit is of the size of the largest Apple; and when thoroughly ripe, difficult to raise without the tortoise-shell like compartments of the rind bursting open, and the fruit dropping to pieces by its own weight. The custard-like substance of the interior has a most delicious and delicate flavour. Dr. Macfadyen, however, speaking of it as produced in the West Indies, says that he "has never met with a European who was partial to it."[‡] This would seem to imply that the fruit produced in India, where it is so universally approved of, must be vastly superior to that grown in what has been assigned as its native locality. The tree, when bearing, requires to be covered by a net, or the produce, before fit to be gathered, will almost be sure to be devoured by birds or squirrels. To effect this more conveniently as well as to improve the bearing properties of the tree, a judicious system of pruning may with advantage be adopted. The fruit may be preserved by wrapping each one up severally, when about the size of a hen's egg, in a piece of thin muslin.

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[*] "Tennent's Ceylon." Vol. I. p. 123.

[†] "Vegetable Kingdom," p. 582.

[‡] "Flora of Jamaica," p. 9.

General Jenkins writes : "The fruit as brought to market are generally forced in straw, being gathered long before they are ripe, otherwise they would require netting. This tree grows in the highest perfection, in the most rocky, hot, and barren parts of the country, and spontaneously. The largest I remember to have seen were at Punnah, the most barren of sterile places. The tree grows out of crevices of rocks and old walls, and apparently wild," * This statement needs some modification. A dry climate during flowering and fruiting suits the plant, but they grow and fruit quite well on the coast.

Plants are propagated from seed, and may also be grafted, and are of very rapid growth, coming into bearing in two or three years time. A supply of old lime or mortar, and cow manure to their roots during the cold months, is of great benefit to them. There is a great opportunity in connection with this plant, for some horticulturist to produce a seedless variety.

Cannot be cultivated on the hills.

ANONA RETICULATA.

BULLOCK'S HEART—SWEET-SOP.

Nona—Râm-phul

A small tree, native of tropical Asia and America, and very common in India.

The fruit differs from the Custard-apple in having a perfectly smooth rind, and derives its name from the resemblance it bears to a bullock's heart. The interior is full of a thick, luscious, custard-like substance. It is not of so fine and delicate a flavour as the Custard-apple, but being in season during the hot months, when Custard apples are not to be had, it is accepted as a very agreeable fruit. While ripening it requires to be protected from the depredations of birds and squirrels and bats, by a netting or by some other means.

Plants are propagated from the pipe sown during the rains, or by grafting, the cultivation being the same as for the Custard-apple.

Cannot be grown on the hills, except in the south of India.

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* General Jenkins' MS. notes.

ANONA MURICATA.

SOUR-SOP.

Bilâetee Nona

A small, shrubby tree, native of the West Indies, with dark-green, shining, laurel-like leaves of a pungent odour something like that of the Black Currant, and a very ornamental object when bearing, in July, its fine large heart-shaped fruit. The fruit Mr. Gosse describes as "lusciously sweet, and of a delightful acidity; often larger than a child's head; covered with flexible prickles." * Grown in this country it by no means realises the above description, but is considered by most persons of so harsh and unpleasant a flavour as to be quite uneatable.

This tree, by no means common in India, Firminger found rather plentiful at Gauhati in Assam, where it produced fruit as large as a moderate-sized Jack.

The fruit begins to ripen about the latter end of June, and is in season in July and August, retaining when ripe its dark-green colour. It is of the form of a bullock's heart rather prolonged, and not unfrequently of a kidney-form, from the apex taking a curve upwards. The substance of the fruit amongst which the seeds are scattered is of a soft, woolly pulp, intermixed with a juicy mucilage of a strong, rather vinous flavour, somewhat like that of the Pineapple; but it is wanting in sweetness, and has a certain degree of rankness that causes it to be disliked by most persons who have not acquired a taste for it. To most palates, however, it may be made agreeable by putting the pulp into a tumbler, sweetening it with pounded loaf-sugar, and pouring over it a glass of sherry. There is a considerable difference in the produce of different trees, some proving vastly superior to others.

Plants are raised easily from the pips sown in July and August, the cultivation being the same as for Custard-apple.

Cannot be cultivated on the hills of Northern India.

ANONA CHERIMOLIA.

CHERIMOYER.

The fruit of the Cherimoyer is described as "of the size and form of Sour-sop, and of a light-green colour, or as holding a middle place between the Sweet-sop and Custard-apple, being subsquamous like the former, and reticulated like the latter."

It is a native of Peru. Mr. Gosse states that the fruit is grown to perfection in Jamaica, but only in certain mountainous localities.

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* "Naturalist's Sojourn in Jamaica," p. 46.

CSL

Mr. Markham says :—

"They have most of the other kinds of Anonas in India, but the Cherimoyer fruit, the most exquisite of all, has yet to be raised. He who has not tasted the Cherimoyer has yet to learn what fruit is."

"The Pine-apple, the Mangosteen, and the Cherimoyer," says Dr. Seemann, "are considered the finest fruits in the world. I have tasted them in those localities in which they are supposed to attain their highest perfection—the Pine-apple in Guayaquil, the Mangosteen in the Indian Archipelago, and the Cherimoyer on the slopes of the Andes—and if I were called upon to act the part of a Paris, I would without hesitation assign the Apple to the Cherimoyer. Its taste, indeed, surpasses that of every other fruit, and Haenke was quite right when he called it the masterpiece of nature." *

Dr. Lindley observes :—

"Fenellé says, one European Pear or Plum is worth all the Cherimoyers of Peru." †

Plants were to be met with in the gardens of the Agri-Horticultural Society as well as in the Calcutta Botanical Gardens, where they were introduced a great many years ago, but their cultivation has been attended with no success. The tree does not even set flowers in Bengal. Dr. Jameson states also in his Report that the Cherimoyer had been introduced into the Saharunpore Gardens, but had been found not to succeed there. Whence, perhaps, it may be fairly concluded there is little prospect of this fruit ever being produced in India, unless possibly upon some spot on the slopes of the Himalaya, or on the Nilgiris.

At Nandidroog there are several new species of Anona growing in the experimental garden, at an elevation of 4,500 feet. These are doing well and bearing fruit. The Cherimoyer would probably do equally well at this elevation throughout Southern India. The factors which are particularly important on its environment are freedom from excessive humidity or precipitation, and cool, but not frosty, weather at the time of ripening.

Propagated from seed sown during the rains, and is also easily budded

DILLENIACEÆ.

DILLENIA SPECIOSA.

Chulta.

A tree of considerable size, native of India ; bears a dense head of exceedingly handsome foliage, with large, noble leaves, and produces in July great, beautiful, pure white, fragrant flowers, succeeded by fruit, having as they hang upon the tree a resemblance to enormous green Apples. These are gathered for use about the middle of September. The part made use of for the table is not the fruit itself but the large, thickened sepals of the calyx, by which it is firmly enclosed. Tasted raw these have the exact flavour of a very sour unripe Apple, and when cooked with sugar have also exactly the flavour of the same fruit cooked in the same way. The great objection to them is the large quantity of fibre they contain. They are very commonly mixed as an ingredient in curries, especially in those made with prawns, to which they impart a most agreeable flovour.

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* "Travels in Peru and India," p. 337.

† "Transactions of the London Hort. Society," Vol. V, p. 102.

Plants are propagated by seed sown in June and July.

Cannot be cultivated on the hills of Northern India.

PART IV.

THE FERNERY.

PART IV.

THE FERNERY.

If it is desired to have a house exclusively devoted to Ferns—and they are beautiful and numerous enough to deserve such a distinction—a structure precisely similar to the conservatory may be erected. The design may be varied, so far as the shape, height and size are concerned.

Ferns all love moisture, and grow to perfection in an atmosphere at once humid and cool. In their natural state they are always to be found in grottos, near springs of water, and shaded situations generally ; and to grow this lovely class of plants successfully, these natural conditions must be supplied artificially as near as possible. Therefore, in a house exclusively devoted to Ferns, one, two, or more reservoirs of water are absolutely necessary ; and if a fountain can be arranged for, not only will the general effect be pleasing, but the atmosphere of the house, during the very dry and hot months, will be maintained in a humid state. But irrespective of these desiderata, a reservoir of water in a plant-house is always very convenient for watering the plants.

The interior of the house may be laid out in ornamental beds in the first instance. These may then be raised with rockwork to varying heights of one to four feet, leaving pockets or spaces for the Ferns to be planted in. The reservoirs of water may be similarly surrounded by rockwork, and made to look very beautiful. The wall running round the house may also have rockwork sloping down from the top at an angle of one in four, and planted with Ferns of low, straggling growth, and spaces filled in with Selaginellas. The effect of this is very striking. The best material for rockwork is concrete or mortar from the roofs of old houses that have been knocked down. This can be had in any size, and not only has it a vey fine effect, but furnishes to the ferns a very important element of food—carbonte of lime. Of course, some soil is necessary and nothing beyond well-decayed leaf-mould mixed with a small proportion of river sand need be used. After the Ferns have taken root, no soil will be necessary, for their roots will attach themselves firmly to the concrete and get all the nourishment they need. If tree-Ferns can be had—and they are plentiful on the hills—they should be planted in the centre, round the reservoir of water. In the south of India, Ferns are extensively grown in pots of all sizes. By this means they are available for decorative purposes wherever they may be wanted. The soils most peat, leaf-mould, and fine sand. Drainage must be efficient.

and a few lumps of charcoal mixed with the crocks will help to sweeten the soil. With a few exceptions, Ferns need very little care to grow them successfully, checkered light, atmospheric humidity, and root-moisture with thorough drainage being the chief requirements. They must never be allowed to suffer from dryness at the roots, and for this reason should be watered twice, or, if necessary, three and four times a day during the arid months of April, May, and June. In the winter months once a day will be sufficient, while during the rainy months they will scarcely need any artificial watering at all, except in the case of pot-plants and when there is a break in the rains, and the sun's rays are so powerful as to evaporate all the moisture from the roots. Ferns must never be put out in full sunlight, nor exposed to wind.

Every part of the rockery in the Fern-house should be planted over with Selaginellas of various kinds. The effect is very fine, while they preserve the roots of the Ferns from becoming dry and exposed. The appended list of Ferns and other Cryptogams only includes the well-known kinds usually found in Indian gardens.

CRYPTOGAMS.

LYCOPODIACEÆ.

Lycopodium

CLUB MOSSES.

A genus of plants possessing great delicacy and beauty, some having much of the aspect of Ferns, while others, as the name denotes, are of a club-like form with imbricate leaves, some erect and some drooping prettily. They are not very easy of cultivation on the dry plains of India and are distinctly difficult where there is a deficiency of humidity in the atmosphere nearly all the year rund. Shade and moisture, such as obtains in the evergreen forests of the Western Ghats, is suitable. At hill stations where there is frost, the protection of a glass house or glazed Fern-case is required. In Lower Bengal, however, and places having a climate similar to it in warmth and humidity, they thrive without any trouble being bestowed upon them, and come to great perfection. The method of cultivation best suited to them is to plant them in a soil composed of a little leaf-mould and river-sand mixed with charcoal and cocoanut fibre and pieces of old mortar or bricks broken up of the size of plums. Baskets made of galvanized wire, or wood, and filled with the above mixture, and having a plant or two of lycopodium in them, have a very fine effect when suspended from the roof of a grass conservatory. They also do very well on shaded rockeries. But the most essential condition for their successful growth is humidity, without which they will never develop to perfection. Lycopods are readily increased by suckers which they throw up plentifully, and which may be taken up and separately planted in pots or baskets. They also reproduce themselves by spores self-sown.

SELAGINELLA.

These comprise the most beautiful of the *Lycopodiaceæ*, and now form one of the most striking ornaments in Indian plant-houses. Many of them can be grown as semi-aquatics in pans of water, in which way they have a fine effect. Others, again, form quite a carpet of emerald-green when grown on rockeries, covering almost every particle of rock and soil, the beautiful effect of which can be heightened by interspersing the carpet of green by planting at intervals such low and prostrate growing plants as *Fittonias*, *Cyrtodeiras*, *Peperomias*, *Schismatoglottis*, etc. Their cultivation is simple enough. If grown in pots, the soil must be light and open. Some well-decayed leaf-mould and river sand, rendered loose with broken bricks, the size of cherries, or better still, old mortar or concrete. Drainage must be thorough. Planted in this way they grow luxuriantly. Shade is absolutely necessary to bring them to perfection. With the exception of *S. lævigata* and *S. serpens*, all the other varieties must be grown in the plant-house.

For rockeries and raised beds there are no plants better suited; in a short time they cover every nook and corner, giving the place a most refreshing appearance. If rockeries are made of large pieces of old mortar or concrete, and a little leaf-mould and sand filled into the interstices, and Selaginellas planted into them, they will soon take root, and go on growing and spreading without any further trouble, beyond copious watering, for they love plenty of moisture.

The best time to plant is just about the commencement of the rains, for it is during the rainy months that Selaginellas are seen at their best. This applies equally to the hills, where however, they must be grown under glazed shelter. About the end of February or beginning of March they begin their spring growth, after resting during the winter, and plants in pots should then be looked to and watered copiously.

They are easily increased by division during the rains. The best way to do this is to take out the root-ball from the pot and divide the entire plant, potting each rootlet separately into small two-inch pots. In the case of those on rockeries, all that is necessary is to take up the rhizomes, sever them from the parent stems, and transplant them.

The following are perhaps the best known and most cultivated in this country:—*S. lævigata* is an old favourite, and a climber, having a metallic lustre of exceeding beauty. *S. serpens* is the common variety mostly used for covering rockeries. *S. kraussiana* and *S. paradoxus* are also used for the same purpose. *S. africana*, *bellula*, *brownei*, *cæsia*, *canaliculata*,, *caudatum* *caulescens*, *gracile conferta, cærulea, emelœ, filicina grovesii, grandis, involvens, lyellii, martensii, variegata triangularis, uncinata, victoriæ, wallichii, and wildenovi* are best suited for pot-culture. One of the latest and handsomest introductions is *S. tassellata*, from Brazil ; it has erect stems, with flat, closely-pinnate branches and branchlets, from the tips of which are produced fertile quadrangular spikelets giving the plant the appearance of being furnished with a profusion of tassels, which have a very striking effect.

FILICES.

FERNS.

Ferns are a very extensive class of plants, all more or less remarkable for their grace and beauty. Being flowerless plant, they come under what are known as Cryptogams. The average amateur in India has an idea that Ferns are very difficult of cultivation, and for that reason very few Ferns find a place in the usual collection of plants grown for the decoration of the verandah or garden. As a matter of fact, Ferns are as easy of culture as any other order of plants, and only require the conditions in which they are found growing in a state of nature, or near as possible approximating those conditions, to bring them to perfection. Any one who has made it his business to collect Ferns on the hills, cannot have failed to notice that these lovely plants are invariably found growing in shady spots, overhanging a piece of water, a running brook or waterfall ; that the soil in which they are thus found growing is fibrous, being a very light mould formed of decayed moss and leaves. Further, that wherever limestone rocks abound, there Ferns will be found to grow in greater luxuriance than even in peat or leaf-mould. By observing the natural conditions in which Ferns grow, one can form a very accurate idea of their wants. It will thus be apparent that in order to cultivate Ferns successfully, we must reproduce, as nearly as possible, the natural conditions referred to above.

Again, many species of Ferns may be seen growing out of crevices in brick walls, and when these are pulled up by the roots, pieces of lime and mortar will be found adhering to the roots. This circumstance points to the fact that lime—especially old lime—is a substance in which Ferns delight very much. From extensive observations extending over many years, the reviser of the fourth edition of this work had come to the conclusion that almost every species of Fern might be successfully cultivated by being planted in a soil almost entirely composed of old mortar or concrete, with a small addition of well-decayed leaf-mould and sand. The roots of Ferns attach themselves firmly to the mortar, from which they derive their nourishment, and the plants themselves present a most healthy appearance.

It may, therefore, be accepted as a general rule that, in the case of nearly all Ferns, a soil consisting of old mortar or concrete broken up into pieces the size of chestnuts—two parts, well-decayed leaf-mould one part, and pure river or coarse silver sand one part, will form a compost most suitable for their cultivation in pots.

It has been noticed above that two essential conditions for the successful cultivation of Ferns are shade and moisture; without these it is useless to expect these lovely plants to grow to perfection. The grass-conservatory as now constructed (*vide* page 35), supplies these conditions. Here there is a beautiful proportion of sunshine and shade, and anyone who has visited the Ferneries in the Calcutta Botanical Gardens must have seen the perfection in which the Ferns are cultivated there. In the Upper Provinces, when the nights are frosty, a glazed structure becomes necessary to protect the plant during the winter months. Even in Bengal glass-houses have been found very useful during the cold months for sheltering Ferns. But, as a general rule, the grass-conservatory will answer all purposes.

On the hills, with the exception of the indigenous species, of which there are numerous varieties, very beautiful, a glazed structure—a hot-house—is an absolute necessity if it is desired to cultivate the beautiful tropical species which form such striking ornaments in the grass-conservatories of the plains. The adiantums, in particular, require a humid climate, which must at the same time be warm. Tree Ferns, Davallias, and the beautiful sweet scented Gymnogramma Massonii, with many other lovely species, cannot be grown on the hills outside a hot house. For those who cannot afford the luxury of such a structure, the ornamental glass Fern-cases, now so common in England, are recommended as admirably suited for the purpose. They can be had in all sizes and designs, at a comparatively cheap prices. Even ordinary glazed frames (*vide* figures 4, 5, 6, page 39) put up in a spot having a southerly aspect, with a hot-bed for plunging the pots in, will be found good enough.

Thorough drainage is a *sine qua non* in Fern culture. To neglect this, is to undo everything that may be done in other respects. Although Ferns love plenty of moisture, they do not like water lying about their roots and stagnating there, rendering the soil sour and unwholesome. The pot in which a Fern is grown should be filled up fully one-third with large pieces of old mortar, kunkur, or bricks with a layer of dry moss over the lot (if this is procurable). Then the prepared soil should be added, and the plant put in.

It may be added here that frequent syringing of the plants in the hot months, or watering overhead with a watering can having a fine rose—especially Ferns kept in a verandah—will keep them in very good health.

Nearly all Ferns can be multiplied by division of roots or by the spores. The best plan, perhaps, is to fill up a pan, or pot, as described

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above, finishing off with a layer of very finely-sifted leaf-mould and sand about an inch deep. Moisten the entire soil thoroughly twenty-four hours previous to sowing, and then scatter the spores lightly over the surface, covering it with a layer of live moss, if procurable, and place under a bell glass, or put a pane of glass over the rim of the pot, place it in a shady position, and in about three weeks or a month the spores will begin to start into growth. Great care must be taken in watering the pot, and the moss only should be damped by means of a very fine spray or rose. The operation of transplanting these tiny plants is a very delicate one, and requires skilful handling to avoid injuring the minute and almost invisible root fibres. Another plan is to select an old brick, cover it with a layer of fine soil, as recommended above, sow the spores, cover over with a layer of live moss, and place the brick in a pan of water just sufficient to cover it to within one-fourth of an inch of the surface, and then place a bell glass over the lot. This will need no watering overhead, and is the plan largely adopted by most practical and successful gardeners in this country.

Since the fourth edition of this work some hundreds of species of Ferns have been added to the old lists. Of course, the greater proportion of these will not be found beyond the Ferneries of the Royal Botanical Gardens, Calcutta. It would, therefore, be tedious to detail all these in a work like this. It has, therefore, been found advisable to describe those species and varieties only which, from their dwarfness, elegance, and general adaptability for ornamental purposes, are best suited for cultivation in gardens of moderate extent and pretensions. Ferns are such a very extensive family that many works are extant specially devoted to them only, and those who wish for more detailed information on this particular point, are referred to these several works, among which may be mentioned Shirley Hibberd's "Ferns and How to Grow Them," and Beddome's "Ferns of Southern India."

HEMIONITIS: DRYMOGLOSS UM.

H. cordata and *D. piloseloides*, natives of Bengal, are curious for their fronds being like ordinary leaves, but otherwise are of little interest.

GYMNOGRAMMA.

Many species of this genus are of great beauty, being dwarf and remarkable for the fronds being covered with a farinose powder, and known in cultivation as gold and silver Ferns. *G. chrysophylla* is considered one of the most beautiful Ferns in cultivation; others noteworthy are—

G. tomentosa; *ochracea*; *martensii*; *calomelanus*; *flaveus microphylla*; *pulchella*, white powdery; and *traingularis*, sulphur-powder. *Massonnii*, the sweet-scented gold Fern; *Peruviana argyrophylla*, *decomposita*, *sulphurea*, and species from Darjeeling.

NOTHOCHLÆNA.

Elegant dwarf Ferns, with fonds having a scaly or wooly surface. remarkable amongst which are—

N. lanuginosa ; sinuata ; rufa ; trichomanoides ; and most beautiful of all *N. Eckloniana.*

POLYPODIUM.

A very extensive genus, the several species of which vary much in aspect one from the other. On the whole not amongst the most ornamental. Indigenous about Calcutta are *P. proliferum ; P. glabrum ; P. adnascens ;* and *P. quercifolium*. Natives of India and noted for their size and beauty are *P. Wallichii ; P. Horsfieldii ; P. Lobbianum ;* and *P. coronans*, with tall, slender, rod-like stripes, and fan-shaped, palm-like fronds. Others noteworthy are *P. albo-squamatum ; sub-auriculatum ; plumula ; pectinatum ; setigerum ; semiadiantum ; eriophorum ; tenuisectum ; dareæ forme Nigrensis*, having a black appearance ; *sporodocarpium ; tridactylon ;* and *virens*, all beautiful.

CHEILANTHES.

Ferns of small growth, delicate texture, and exquisite beauty, notable amongst which are *C. Argentea,* the varieties of which are familiar in Assam under the name of gold and silver-Ferns, from the pulverulescence on the under side of their fronds *C. elegans ; radiata ; multifida ; farinosa,* var. *Mexicana myriophylla,* very lovely, and *lendigera*.

ADIANTUM.

MAIDEN-HAIR FERNS.

A very extensive genus, comprising perhaps some of the most beautiful Ferns in cultivation. There is a remarkable similarity in their general aspect, so that an Adiantum cannot be mistaken for any other species. Their greatest recommendation is that they are easy of cultivation. During recent years considerable additions have been made to their numbers.

In the Calcutta Botanical Gardens, and some of the large nurseries about Calcutta, there are perhaps about seventy varieties in cultivation. They all love shade and moisture. Nearly all the varieties bearing fertile fronds can be propagated by showing the spores. Some of them easily increased by division.

The following list comprises the most beautiful of the genus, and may be relied upon as sufficient for all ordinary purposes:—*A. Farleyense* ; this is *par excellence* the most beautiful species

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in cultivation, and must be grown in a glass case to bring it to perfection. *Lunulatum*, common about Calcutta growing out of old walls; *gracillimum*; *aneitense*; *amabile*; *concinnum*, and *concinnum latum*; *dolabriforme*; *lowsonii*; *Luddemanianum*; *macrophyllum*, *pedatum*; *rhodophytum*; *cuneatum*; *scutum*; *tenerum*; *princeps*; *peruvianum*; *seemannii*; *trapeziforme*; *Veitchii*; *villosum* and *Capillus Veneris*, the old maiden-hair.

The following are most of the other species in cultivation. They are all more or less remarkable for their beauty, and are included here to render the list as complete as possible:—*Assimile*; *Bauseii*; *bellum*; *ciliatum*; *cultratum*; *decorum*; *cuneatum*; *dissectum*; *curvatum*; *Edgeworthii*; *excisum multifidum*; *Flemingii*; *formosum*; *Foxii*; *Funckii*; *Hendersonii*; *fulvum hispidulum*; *intermedium*; *legrande*; *Lowii*; *neoguinense*; *pulverulentum*; *recurvatum*; *rhomboidum*; *rubellum*; *sancta Catherinæ*; *Shepherdii*; *speciosum*; *tinctum*; *velutinum*; *Wilsonii*; *Victoriæ*; *Gheisbrightii*; *monochlamys*; *Williamsii* and *Wilesianum*.

PLATYCERIUM.

ELK'S-HORN OR STAG'S-HORN FERN.

The two species of this remarkable Fern usually found in Indian gardens are *P. alcicorne*, the true Elk's-Horn, and *P. grande*. Both are introduced from Australia, and both are epiphytes which need support on a rustic block of wood, the trunk of a suitable tree, a hanging basket, or a shallow pan. In such positions the roots should be lightly covered with sphagnum moss, intermixed with bits of peat and charcoal.

When properly grown in a sheltered position, these rare plants attain a large size and present a most striking appearance.

PTERIS.

P. amplectens.—A common weed about Calcutta; fronds pinnate with the pinnæ five or six inches long, of the form of a blade grass. A spare dark corner in the garden should always be assigned to this handsome Fern, as a frond or two inserted in a bouquet has a delightful effect.

Among many of this genus may be mentioned for their beauty—*P. semipinnata*; *leptophylla*; *Cretica*, var. *a'bolineata*, *quadri aurita*, var. *argyrea*, var. *leucophylla*; var. *multifida*; *podopylla*; *aspericaulis*, var. *bicolor*; *serrulata*; var. *cristata*, var. *polydactylon lacerata* and *variegata dentata*; *ludens*; *nobilis*; *tricolor*; *umbrosa* and *undulata*.

ASPLENIUM.

A very extensive genus of Ferns, varying much as to aspect. Some have their fronds entirely simple, and some finely divided.

A. nidus, var. *Australiacum*—BIRD'S-NEST SPLEENWORT.—A truly noble and most ornamental Fern, with fronds a yard or more long, somewhat like those of a Plantain, but tapering to a point; of purest pale apple-green, against which their dark chocolate ribs and bases form a handsome contrast; long cultivated about Calcutta where it thrives well in a pot or in the border under shade.

Amongst those most remarkable for dwarfness and the exquisite beauty of their finely-divided fronds are *A. cicutarium*; *umbrosum*; *Fabianum*; *laserpilifolium*; *viviparum*; *Belangeri*; *brachypteron*; *rachirhizon mucronatum*; *deliculatulum*; *adiantioides*; *Halleri*; *rutaceum*; *ferulaceum*; *formosum*; *bulbiferum*; *præmorasum*; *aculeatum*; *esculeatum*; *Goringianum*; *tricolor*; *hispidum*; *lanceum*; *nitidum*; *Veitchianum*; and *dimorphum*.

ACTINIOPTERIS.

Curious and most interesting Ferns, resembling minute Fan-palms. *A. flabellata* is a native of India, grows on old walls and out of rocks at Agra. *A. radiata* is the Fan-Fern.

ONYCHIUM.

O. lucidum.—A Fern of exceeding beauty, with pinnatifid, spray-like fronds; native of Nepal, and thrives well in Calcutta gardens. *Japonicum* is also a beautiful variety.

NEPHRODIUM.

Contains some very beautiful species, among which are *N. invisum*; *latifrons*; *recedens sanctum*; *molle,* var. *corymbiferum*; *cuspidatum*, and *polynosiphum*.

ASPIDIUM.

Upon the whole not very ornamental Ferns.

1. *A. proliferum.*—A beautiful species, with large, finely-divided, plume-like fronds; thrives well about Calcutta.

2. *A. squalens.*—A common Fern, tolerably pretty, the frond consisting of the mid rib, with a row of green comb-like teeth on each side.

A. Klotzohii and *A. denticulatum* are very graceful and feathery. *A. triangulare* and *A. falcatum*, says Sir W. Hooker, are coveted by Fern-growers for their beauty. Also *Germinyi*; *trifoliatum* and *macrophyllum*; of later introduction, and considerable beauty.

DAVALLIA.

Among the handsomest Ferns of the order. Some two or three species from Port Blair have been long in the Agri-Horticultural Society's Gardens. These, like many of the genus, have white, wooly stems about the thickness of a man's little finger, which lie flat upon the ground or the object that supports them, in delightful contrast with the elegant, verdant, plume-like fronds.

Especially to be noted for their beauty are *D. Affinis* ; *canariensis*, the hare's-foot Fern ; *ciliata* ; *leucostegia* ; *stenoloma*; *bullata*; and *elegans*, var. *dissecta*, a truly lovely object as seen clinging to a log some six feet high. *Fijiensis* and *Fijiensis plumosa*, are perhaps the most beautiful in cultivation, and are recent introductions. Other beautiful species are *Mariesii* ; *Mooreana* ; *pentaphylla*, and *Tyermanni*, all later introductions.

ALSOPHILA ; CYATHEA.

Genera consisting principally of tree Ferns, some few of which have been introduced into Calcutta Botanical Gardens, but are too large and coarse for a private garden. The two best for general cultivation are *A. Australis* and *Cooperii*.

Alsophila latebrosa is the common tree Fern of the country. In the South of India it is confined to the Western Ghats where it is frequently seen in groves of marvellous beauty.

TRICHOMANES.

The most delicately beautiful of all the Fern tribe. They require constant humidity and shading, and great care and attention to cultivate them successfully. Amongst the most ornamental are—*T. pinnatum* ; *crispum* ; *Leprierii* ; *Mallingii* ; *spicatum*; *Javanicum*; *Bancroftii* ; *Spruceanum* ; and *pluma*.

GLEICHENIA.

Sir W. Hooker states of *G. dicarpa* that "no Fern at Kew is more admired for its graceful form with tender feathery, drooping branchlets ;" and of *G. flabellata*, with its large, date-palm-like fronds, that "Kew does not boast a more lovely Fern." See also *G. circinata* ; *G. circinata semi-vestita* and *G. dichotoma*.

LYGODIUM.

L. scandens—CLIMBING FERN.—A native of Mysore ; thrives well in the locality of Calcutta; a slender, graceful, climbing plant, with exquisite filigree-like fronds. Another lovely variety is *L. circinatum*, *L. Japonicum* and *L. palmatum* should be included.

ANTIGRAMMA.

A genus of Brazilian Ferns, closely allied to *Asplenium*, and lately introduced into this country. There is only one variety cultivated out here, viz. *A. brasiliensis*, a beautiful object when well grown.

ATHYRIUM.

This genus is also closely allied to *Asplenium*, with which it is confounded by some. The *A. felix-femina*, a beautiful British species, is found in great abundance on the Upper Himalayan ranges. The only tropical species cultivated on the plains, and recently introduced, is *A. goringianum tricolor*, a lovely species, but rather difficult to cultivate. Must be grown in a grass-conservatory.

BLECHNUM.

An extensive genus of Ferns, allied to Lomaria, natives of Europe and the tropics. They are not particularly remarkable for beauty, having plain fronds. The best perhaps is *B. occidentale*, a native of tropical America.

DEANSTÆDTIA.

These are what are known as herbaceous Ferns, the only variety worth cultivating out here being *D. davallioides youngii*. Closely allied to *Dicksonia*.

DICKSONIA.

A genus of noble arborescent or tree Ferns, native principally of the southern hemisphere. *D. antartica* is perhaps the most beautiful variety, native of Australia, and grows fairly well in Bengal in a grass-conservatory.

HYMENODIUM (Detyoglossum)

Allied to *Acrostichum*, natives of the West Indies. The best for cultivation are *H.* (*D*) *japonicum variegata*, having a variegated surface.

DOODIA.

Handsome Ferns, natives of New Holland. The variety met with in this country is *D. blechnoides*. Grows well in a grass-conservatory.

DRYNARIA.

An extensive genus, spread over a large area. Varieties are found throughout the Himalayan upper ranges, on the plains, in Australia, and the West Indies. There are only few species worthy of a place in a garden collection. The Oak-leaf Ferns, found on the hills, are of this genus. *D. musæfolia,* which resembles a dwarf plantain tree, is about the only variety Firminger saw in cultivation in Indian collections. The genus is closely allied to *Polypodium,* that being one of the synonyms under which it is known.

HYPOLEPIS.

A small genus, all tropical principally natives of the West Indies. Closely allied to Cheilanthes. The only variety worthy of a place in a collection is *H. elegans.* Requires shade and moisture to grow it to perfection.

LASTREA (Nephrodium).

Nearly all of this handsome family are tropical; many of them natives of India and Ceylon. There are nearly a hundred varieties enumerated by botanists. Those which Firminger met with in cultivation, and which deserve a place in a Fern Collection, are: *L. Aristata variegata,* a very fine species; *L. glavella,* a native of New Zealand; *L. richardsii multifida* and *aristata,* perhaps the two handsomest. A few representatives of *Lastrea* are also to be found on the hills, where they are indigenous. Rather a difficult genus to cultivate successfully, requiring a decidedly limy soil.

LOMARIA.

A few of this genus might be cultivated with advantage. None of them are natives of this country, tropical America and Australia being their habitat. *L. gibba,* from New Caledonia, and *L. lanceolata,* from New Zealand, being the only two Firminger met with in this country. Very easy of propagation by division.

NEPHROLEPIS.

A genus comprising a few beautiful species. Very easy of culture. *N. furcans* forms a magnificent object, with its large drooping fronds, having a bunch at the end of each. As a specimen Fern, there is scarcely another to surpass it. *N. duffi* is also a very pretty object when well grown. Well suited for hanging baskets. *N. pluma* and *N. davallioides,* may also be included in a collection. All very easily increased by division.

OSMUNDA.

This genus includes what is known as the flowering Fern, or King or Royal Fern, the *O. regalis,* a British species which, however, can be grown out here successfully in a grass-conservatory. *O. palustris* is also a pretty Fern. On the hills these Ferns grow remarkably well, and without any trouble.

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PHLEBODIUM (Polypodium).

A handsome genus of net-veined tropical Ferns. The only variety met with out here is *P. aureum*, or Golden Fern, a beautiful object when well-grown; native of tropical America. Must have absolute shade and much humidity to bring it to perfection.

N. B.—It has not been considered advisable to include here the many varieties of Ferns to be met with on the hills, and which grow there in a wild state, as it has been found impossible to cultivate them on the plains. Nor has it been thought necessary to include such as are so rare as to be almost beyond the reach of amateurs, and which only find a place in botanical collections, not on account of their beauty and usefulness, but for purely botanical interests, to complete the collections for purposes of classification and study. The present work does not profess to be a botanical treaties, but a manual of gardening only.

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PART V.

THE FLOWER GARDEN.

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THE FLOWER GARDEN.

ORNAMENTAL ANNUALS.

FEW persons, perhaps, who in this country care to cultivate a flower garden at all, would be willing to dispense with Annuals. While trees and shrubs form the background of a garden, the Annuals with their gay assortment of colour are the picture itself.

For those who do not desire to cultivate more than a limited few, a list is here given of such as are never likely to cause disappointment in flowering if only the seed is good.

Acroclinium roseum.
Ageratum mexicanum.
Amarantus caudatus.
" hypochondriacus.
" tricolor
Antirrhinum.
Aster chinensis.
Balsam, all sorts.
Brachycome iberidifolia.
Browallia elata.
Cacalia coccinea.
Calendula pluvialis.
Calliopsis, all sorts.
Callirhœ digitata.
Carthamus tinctorius.
Celosia cristata, and varieties.
Centranthus macrosiphon.
Convolvulus.
Cornflower.
Cosmos.
Datura, all sorts.
Delphinium.
Dianthus chinensis.
Didiscus cæruleus.
Gaillardia.
Godetia.
Gomphrena globosa.
Hibiscus giganteus.
" lindleyi.
Iberis.
Ipomœa limbata.
" rubro-cærulea.
Linaria.
Linum grandiflorum.
Lobelia ramosa.
Lupinus, all sorts.
Malcomia maritima.
Martynia diandra.
Mimulus.
Nemophila insignis.
Nicandra physaloides.
Nicotiana, of sorts.
Pentapetes phœnicea.
Petunia.
Phlox.
Poppy.
Portulaca.
Quamoclit vulgaris.
Reseda odorata.
Rhodanthe manglesii.
Salpiglossis.
Salvia splendens.
Scabiosa.
Stocks, all sorts.
Sunflower.
Tagetes, all sorts.
Tropœolum, of sorts.
Verbena.
Viola tricolor.
Whitlavia grandiflora.
Zinnia elegans.

THE TIME FOR SOWING THE SEED.—The time for sowing seed is well-established by local practice and should be followed. It depends on rainfall and temperature. In Bombay city, for example, with its heavy rainfall and high monsoon wind, it is necessary to wait till October before sowing. In Poona, with a light rainfall and moderate temperature, sowing should be done just before the rains break, as Annuals do well throughout the Deccan *during* the rains. Another lot of seed can be sown in August for a cold-weather garden in the Deccan. The same applies as far south as Bangalore. In the colder climate of Ootacamund, sowing in boxes may begin as early as February, and may be continued at intervals until August or September. March and August are considered the best months for sowing Annuals in the ground on the hills. In the Upper Provinces, the sowing should take place as soon as the abatement of the heat will allow, in order that the seedlings may be well advanced before the weather sets in at its coldest, during which period they remain quite stationary, making little or no growth whatever. Nasturtiums, for instance, with the pretty Canary Creeper, must be sown in time to make a good growth before the frosty nights come when they have to be carefully protected from the cold. If the sowing be deferred till the cold season is over, the plants will be killed by the approach of the hot season before they have put forth a blossom.

In Bengal, again, there are certain of the Annuals which take the whole of the time that the cold weather lasts to complete their growth, and only come into blossom just at its close. If the seeds of such kinds be not sown very early, it amounts almost to a certainty that the plants will die without flowering. Among these in particular may be mentioned Cineraria, Asters, Jacobæa, and Salpiglossis.

Others, on the other hand, blossom within a much shorter period; of such it is advisable always to reserve a portion of the seed for sowing in November. Among these may be mentioned more especially Nemophila and Larkspurs, the seed of which will not germinate till the weather has become quite cold, and when sown early is liable to be lost before germinating.

There are others, moreover, of which if sowings be made much before the approach of the cold weather, the seedling will spring up so readily as to exhaust themselves by the rapidity of their growth becoming so attenuated that it requires the greatest care to keep them from perishing. To this may be attributed, as often happens, the damping off of the whole batch of seedlings.

On the hills the most favourable time for sowing Annuals of all kinds is about the first week in March, as the season of flowering extends from April to September and October. There are some species, however, which take a long time to complete their growth, and these must of necessity be sown very much earlier. Among these may be mentioned Cinerarias, Calceolarias, Larkspurs, and a few others. The proper instructions for time of sowing, etc., will be found under the head of such species, as these remarks are only made here in a general sense to show that all Annuals must not be sown at one and the same time. The reader should also consult the Calendar of Operations on pages 98 to 114.

MODE OF SOWING.—Sowing in pots is, no doubt, the more sure and economical plan; for in that case the seeds are comparatively safe from the ravages of ants, of all things the most to be guarded against.

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It is essential that the soil used should be of a loose description, so that there be as little risk as possible of breaking the tender, threadlike-roots of the seedlings in the process of what is called "pricking out." No better compost can be used than the following:--

Leaf mould	8 parts.
Common mould	8 parts.
Sand	1 part.

These seeds when sown should be covered with nothing more than a mere sprinkling of soil, pressed down upon them gently with the hand or, better, with the bottom of a flower-pot.

It is of the utmost importance that the seedlings should, from the very first have, during the day, all the light and air that can possibly be given them short of absolute sunshine, and at night, when the weather will admit, be put out in the open to receive the dew.

The mode of raising Annuals, however, attended with least trouble is to select a small plot of ground just the sufficient size for the purpose; dig it well, and make it very light and mellow with vegetable mould, and perfectly level. Then divide it off into little compartments, and in each sow a different kind of seed, and affix a label. But a better plan yet, is to draw drills over the plot at the distance of half a foot between each drill, and sow in them the different kinds of seeds in succession. It is thus known exactly where to look for the seeds to come up; when up also they are far more easily transplanted from drills than when the seed has been sown broadcast. Still, whichever plan is adopted the whole plot must be sheltered from the sun during the day, and in bad weather at night, with a covering of bamboo matting, supported on a bamboo frame about three feet from the ground. About four and twenty hours previous the soil should be well drenched so that at the time of sowing without being wet and cloggy, it may be found moist and mellow.

The disadvantage of this plan, and nearly the only one, is that the greater portion of the seed is apt to be carried off by red ants where these occur; but this is of not so great importance if seed is abundant, as quite enough will probably be left to supply as many plants as are required. The seedlings come up with far greater vigour and robustness than they do when raised in pots, and seldom damp off.

On the hills the best plan is to sow in pans, which should be kept sheltered, not from the sun as in the plains, but from the cold. For this purpose it is desirable to keep the pans in glazed frames, having bottom heat; or, better still. in a green-house, if such a structure is available, until the seedlings have made some growth, when the hardier kinds might be planted out in beds and borders, and the more tender varieties pricked out into other pans and pots.

If no glazed protection is available, the shelter of a verandah to keep the pans in at night will be found sufficient, unless the month of March is particularly cold and raw, as sometimes happens. In the latter case it will depend very much upon individual and local circumstances in what way young seedlings must be protected from cold in severe frosty nights.

TRANSPLANTING.—"Annuals," says Sir J. Paxton, "with the exception of a few particular sorts, all will derive great benefit from being transplanted. It will check the natural exuberance of their growth, and promote the production of flowers."* "I am convinced," says Mr. M'Meekin, head-gardener formerly to the Agri-Horticultural Society, "that Annuals in this country are improved by transplanting."

It must be observed, however, that the season here is of so much shorter duration for Annuals to mature their growth in than it is in Europe, and the length of the day is also so much shorter, that many cannot allow of the check of their growth which a transplanting always more or less causes. As a general rule for guidance in this matter, Firminger observed, with regard to all herbaceous plants, as well as Annuals, that those which love a rich, damp soil, such as Mimulus, Nemophila, Aster, Cineraria, Balsams, etc., in no way suffer, but are rather benefited by transplantation; while those plants the natural locality of which is a dry, arid soil, such as Lupins, Portulaca, Poppy, Eschscholtzia, Mignonette, etc., suffer severely and often irrecoverably from the process.

On the hills, however, no such fears are entertained, as the season is as long as that in England, and nearly every species may be transplanted with advantage. But great care is necessary as to watering seedlings.

Seeds of Annuals, which suffer too great a check from being transplanted, may, especially when seed is plentiful, be very advantageously sown at once in the border on the spot where they are to remain. The following excellent directions, given by Sir J. Paxton on the subject, apply equally well in this country as in Europe :—

"Make the soil fine with the hand. With the finger draw a circular drill of about six inches in diameter and one inch or less deep. Cover the seeds lightly with moist soil. Place an inverted flower-pot over them, and allow it to remain till the seeds begin to grow (this may be 24 hours only). Then prop it on one side two or three inches high, until the plants are able to bear the weather. Afterwards remove it altogether." †

The seed must not be cast merely on the hard, dry soil of the border, but a little mellow leaf-mould or old well-decayed cow-manure should be mixed up with the soil on the spots where the sowings are to be made.

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* "Magazine of Botany," Vol. VI, p. 96.
† "Botanical Magazine," Vol. I, p. 19.

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Annuals in the border require daily watering. The plan of flooding the border in the Upper Provinces is very prejudicial to some kinds, causing them to rot at the collar of the stem just previous to blossoming. With a little care this may easily be prevented. If the border be perfectly level, as it ought to be, water may be let in upon it just sufficient to crawl over the ground until it wets the whole surface. This is best done in the morning. If done in the afternoon, during the cold weather, the frost acting upon the damp soil, will be far more likely to cause injury to the plants.

ORNAMENTAL TREES, SHRUBS, AND HERBS.

The plants described here comprise, it is believed, nearly all with any pretensions to an ornamental character, and of which we have any knowledge as being found in Indian Gardens. It will, however, be seen that a considerable proportion of these are only to be met with in the Botanical Gardens, and among the collections offered for sale by the nurserymen and plant-merchants of the country. The reasons for this are obvious. In large public gardens and private nurseries, facilities exist for importing and otherwise obtaining new and rare plants which private individuals do not possess; while in the way of plant-houses and other structures used for growing plants in the gardens above mentioned, such gardens possess advantages which are necessarily beyond the resources of amateurs as a rule. Nevertheless, it has been considered advisable to include here, as far as possible, all plants now in cultivation.

The cultivation, propagation, and general treatment adapted for the choicer and rarer kinds, as well as the more common favourites, have been given, as a rule, at length, for the plains, and in somewhat less detail for the hills; but in reference to such as are so common and hardy as to be met with in an indigenous state, they are dealt with more or less summarily.

Opportunity has been taken to give lists of plants for the convenience of those who wish to make a selection for any of the purposes specified at the heading of each. These plants will be found fully described in their proper places. It is to be understood, however, that when a generic name only is given, as for example, in the case of Begonia, Bletia, etc., more than one of the species are suited for the purpose. The lists are necessarily limited, but they have been made so purposely.

THE FLOWER GARDEN.

1. Plants suited to be grown in pots to decorate the Verandah :—

Abutilon Bedfordianum.
Aloysia citriodora.
Arumpictum.
Asystasia formosa.
Begonia.
Bletia.
Chrysanthemum.
Cissus.
Caladium.

CSL

Croton.
Euphorbia,
jacquiniflora.
Eucharis amazonica.
Ferns.
Francisca.
Fuchsias.
Geranium.
Gesnera.
douglasi.
Habrothamnus fasciculatus.
Hoya.
Hydrangea.
Jatropha panduræfolia.
Jasminum.
Lemonia spectabilis.
Olea fragrans.
Orchids.
Palms.
Pentas carnea.
Rondeletia punicea.
Roses.
Salvia splendens.
Solanum argenteum.
Talauma pumila
Tetramena.
mexicana.
Torenia.
Verbena.

2. Bulbous and Tuberous-rooted Plants suitable for pots :—

Anemone.
Achimenes.
Amaryllis.
Arum pictum.
Begonia.
Caladium.
Cipura.
Crinum.
Crocus.
Cyclamen.
Dahlia.
Eucharis amazonica.
Funkia subcordata.
Gladiolus.
Gloxinia.
Gesnera.
Hippeastrum.
Hyacinth.
Iris.
Ixia.
Jonquil.
Lilium longifolium.
Maranta.
Narcissus.
Oxalis.
Pancratium.
Ranunculus.
Richardia ethiopica.
Sparaxis.
Spiræas.

3. Climbing Plants suitable for pots :—

Asparagus, plumosus & nanus.
Æschynanthus.
Cissus.
Clerodendron splendens.
Clitoria.
Cobæa scandens.
Hoya.
Lophospermum scandens.
Manettia cordifolia.
Maurandya.
Meyenia hawtayneana.
Passiflora.
Stephanotis floribunda.
Thunbergia.

4. Scandent and Twining Shrubs :—

Abrus precatorius
Akebia quinata.
Allamanda.
Aniseia media.
Argyreia splendens.
Aristolochia.
Asparagus racemosus.
Banisteria laurifolia.
Batatas paniculata.
Bauhinia.
Beaumontia grandiflora.
Bignonia.
Bougainvillea.
Centrosema plumeri.
Cereus nyctocallus.
Clitoria.
Cobæa scandens.
Combretum.
Congea azurea.
Convolvulus pentanthes.
Cryptostegia grandiflora.
Dalbergia.
Dipladenia.
Echites.
Gloriosa superba.
Henfreya scandens.
Hexacentris coccinea
Hiptage madablota.
Ipomæa.
Jasminum.
Lonicera.
Melodinus monogynus.
Murucuja ocellata.
Pæderia fœtida.
Parsonsia corymbosa.
Passiflora.
Pentalinon suberectum.
Pergularia odoratissima.
Petræa volubilis.
Poivrea coccinea.
Porana paniculata.
Quisqualis indica.
Rhyncospermum jasminoides.
Roupellia grata.
Rivea bona nox.
Securidaca.
Spathodea uncinata.
Stapelia.
Stephanotis floribunda.
Tecoma.
Thunbergia.
Wistaria sinensis.

5. Plants remarkable for the Fragrance of their Leaves :—

Aloysia citriodora.
Andropogon martini.
Artemisia abrotanum.
Cinnamonum.
Citrus.
Clausena heptaphyla.
Crossostephium artemisioides.
Dracocephalum canariense.
Geranium, lemon and rose-scented.
Lantana.
Lavandula.
Lemonia spectabilis.
Myrtus communis.
Ocimum.
Pimenta vulgaris.
Plectranthus aromaticus.
Pogostemon.
Ruta.
Vitex.

6. Trees and Shrubs remarkable for the strong Fragrance of their blossoms :—

Acacia.
Aglaia odorata.
Artabotrys odoratissimus.
Artemisia lactifolia.
Cæsalpinia coriaria.
Chimonanthus fragrans.
Citrus.
Clerodendron fragrans.
Dalbergia sissoo.
Dombeya.
Eupatorium odoratum.
Franciscea.
Gardenia.
Hamiltonia.
Hedychium.
Heliotropium.
Hoya.
Ixora.
Jasminum.
Jonesia asoka.
Lawsonia alba.
Lonicera.
Magnolia.
Mesua ferrea.
Michelia champaca.
Micromelum integerrimum.
Millingtonia hortensis.
Mimusops elengi.
Murraya exotica.
Nerium.
Nyctanthes arbortristis.
Olea fragrans.
Pandanus odoratissimus.
Pergularia odoratissima.
Photenia dubia.
Plumieria.
Polyanthes tuberosa.
Portlandia grandiflora.
Rhyncospermum jasminoides.
Rose.
Stylocoryne weberi
Talauma pumila.

7. Trees and Shrubs of Oramental Foliage :—

Anthurium.
Aralia.
Acæna.
Acalypha.
Alocasia.
Araucaria.
Asparagus.
Caladium.
Callistemon.
Castor (red variety).
Celastrus scandens.
Cissus.
Coleus.
Croton.
Curmeria wallisii.
Cupressus.
Cyanophyleum magnificum.
Chamæcladon rubens.
Diffenbachia.
Dioscorea.
Dacrydium.
Dracæna.
Echites picta.
Elæagnus.
Eranthemum.
Exæcaria.
Filicium decipiens.
Gesneria refulgens.
Grevillea robusta.
Graptophyllum.
Heliconia.
Hibiscus zebrina.
Juniperus.
Lourea vespertilionis.
Maranta.
Mimosa brevipinna.
Musa sumatrana.
Nandina domestica.
Nepenthes.
Panax.
Palms.
Pavetta diversifolia.
Pellionia.
Peperomia.
Pisonia.
Pittosporum.
Poinsettia.
Podocarpus.
Pothos.
Pterospermum.
Ruellia maculata.
Thuja.
Schismatoglottis.
Urtica.
Xylophylla.

8. The annexed short lists of trees may be of use to readers of this book. Fuller details will, of course, be found in the body of the work.

Evergreen Trees.

Exotic trees suitable for Shade or Effect in sub-tropical India :—

SCIENTIFIC NAME.	HABIT OF GROWTH
Araucaria cookii	Symmetrical and conical.
" bidwillii	"
" cunninghamii	"
" " var. glauca ..	"
" excelsa	"
Dammara robusta	"
" australis	"

Cupressus sempervirens	Erect, compact, columnar and funerea.
" torulosa	Conical.
Anda Gomesii	Round-headed and moderately spreading.
Castanospermum australe	Round-headed and moderately spreading.
Eucalyptus rostrata	Australian gumtrees.
" citriodora	
Ficus Benjamina	Robust and wide-spreading.
" var. comosa	"
" roxburghii	"
" macrophylla	"
" cunninghamii	"
" elastica	"
Artocarpus cannoni	"
Grevillea robusta	Conical, with silvery-foliage.
Kigelia pinnata	Round-headed and very dense.
Nephelium litchi	"
" loganum	"
Pithecolobium saman	Robust and wide-spreading.
Schinus molle	Weeping.
Swietenia mahagoni	Round-headed.
" macrophylla	"
Cæsalpinia coriaria	Umbrella-shaped.
Cassia siamea	Moderately round or ovoid.
" marginata	Round-headed.
Parkia biglandulosa	Round-headed at the summit of a tall trunk.
Colvillea racemosa	Moderately round and spreading.
Brassaia actinophylla	Umbrella-shaped.
Lagunaria patersoni	Conical.

9. Indigenous trees suitable for Avenues and Roadside planting at elevations ranging from 2—4,000 feet in Southern India :—

SCIENTIFIC NAME.	HABIT OF GROWTH
Polyalthia longifolia	Slow of growth.
Pterospermum heyneanum	
Ochrocarpus longifolius	Best towards the hills.
Calophyllum inophyllum	"
Thespesia populnea	
Citrus decumana	
Bursera serrata	Slow of growth.
Filicium decipiens	
Azadirachta indica	
Melia azedarach	
Gelonium lanceolatum	Best towards the hills.
Amoora rohituka	
Chickrassia tabularis	
Ficus retusa	
" Tsiela	
Mangifera indica	
Dalbergia sissoo	
Mimusops elengi	Best in the Mainad.
Diospyros embryopteris	
Tamarindus indica	
Saraca indica	
Eugenia jambolana	
Artocarpus integrifolia	

10. Indigenous trees suitable for Avenues in the Hill districts of Southern India :—

SCIENTIFIC NAME.	HABIT OF GROWTH
Antiaris toxicaria	Upas, or sack tree.
Dillenia bracteata	
Garcinia xanthochymus	Conical in habit.
Hopea parviflora	
" wightiana	
Anthocephalus cordatus	
Myristica laurifolia	
" magnifica	
Mesua ferrea	
Hydnocarpus alpina	
Vateria indica	
Melia dubia	
Michelia champaca	
Mimusops elengi	
Calophyllum tomentosum	
Ficus trimeni	
Artocarpus hirsuta	Wild jack.

CLASS GYMNOSPERMÆ.

CYCADACEÆ.

CYCAS.

A genus of hardy Palm-like plants of great beauty, especially when young, having a short cylindrical, rough trunk terminating in a symmetrical crown of deeply pinnate leaves varying from 2 to 8 feet in length. When young, the leaves are pale green ; but in maturity they are coriaceous, dark green and shining, most useful for decoration, being easily formed into plume or feather patterns, which last for a considerable time. Plants grow slowly, and having a tendency to throw out suckers, are easily propagated from these. *C. revoluta*, a native of China and Japan, is naturalised in the country, and is one of the commonest plants met with in Indian gardens. It is at its greatest beauty in March and April, when the young leaves are unfolded. *C. circinalis* in Malabar attains a great size, trunk being 10 to 15 feet, bearing a noble crown of leaves 8 to 12 feet in length. *C. rumphii* is another indigenous species of great beauty. *C. media* is an introduction from Australia, having a tall, stout trunk, crowned with a magnificent head of finely pinnate leaves of somewhat variable form in its several varieties. *C. siamensis* and *C. circinalis* do well in the open ; but other species require some shade and do well in the fernery or palm-house.

ZAMIA.

A very handsome genus of *Cycads*, differing very little from *Cycas* in general appearance, except that their leaves are more feathery and fern-like. They are distinguished from *Cycas* by the leaf-stalks, having the appearance of growing out in a tuft from the summit of the stem. There are several species in cultivation, notable among them being *Integrifolia*, *Furfuracea*, *Lindeni*, *Pumila*, *Kickxi* and *Angustifolia*. Although imported from widely different parts of the globe, these plants do well under the chequered shade of trees and plant-houses. They form conspicuous objects when planted on large rockeries.

MACROZAMIA.

This genus is closely allied to the preceding, and comprises half a dozen, or so, of highly ornamental species from Australia where they are said to grow in swampy ground near the sea. The most beautiful species are *M. Corallipes*, *Mackenzii*, *Plumosa* and *spiralis M. cylindrica* is also a fine plant, while *Denisonii* and *Miqueli* are the commoner species.

Being moisture-loving plants, they succeed best in a damp section of the fernery standing over water. As these plants rarely seed or throw out suckers in this country, collections have to be maintained by importation from leading nurserymen.

ENCEPHALARTOS.

A very handsome class of plants somewhat similar to the above, mostly introduced from tropical and Southern Africa where they attain a large size. In cultivation they require a strong loamy soil freely mixed with river sand. Growth is slow, and the plants live to an old age. The species mostly found in Indian gardens are *E. horridus*, *Caffra*! *Lehmanni* and *Plumosus*. Viewed as a whole, the plants of *Cycadaceæ* bear a considerable resemblance to palms and tree-ferns. But they are quite distinct from both, being true gymnosperms.

CONIFERÆ.

CONIFERS.

PINUS.

P. longifolia.—A lofty tree, native of the hills, but succeeds very well on the plains of Northern India, where specimens of large size may occasionally be seen. It is, however, not well suited to gardens of limited extent, taking up far too much room. In large public gardens, planted on lawns, it has a fine effect.

There are other species of *pinus* found on the hills, but all are unsuited for the plains of Southern India. Propagated from seed.

ARAUCARIA.

A genus of exceedingly handsome trees; superbly ornamental when grown upon a lawn, where there is ample space for them. Specimens of the undermentioned have at different times been brought in Wardian cases to Calcutta, where they thrive well. The seeds travel very badly, soon losing their vitality; and propagation by cuttings, though attended with success elsewhere, has, as far as Firminger could learn, been universally found to fail in Calcutta, where the leading nurserymen instead import large numbers of young plants from Australia and thus keep up the supply. Trees have also been raised from seed, but barely five per cent germinate; so that it is more convenient and profitable to import young plants. Firminger gives the following method of striking cuttings as described by M. Courtins :—

"Some species strike much more readily than others, *A. cunninghamii* most easily of any. Take cuttings of shoots half ripe, about three inches long. Terminal shoots of side branches may be used. Let them lie till somewhat dry, to allow the turpentine to exude. When they have grown a few inches, bend the plants gently down towards the surface of the soil, and secure them in this position by small pegs. This will induce them to break out at the base. When the shoots, which have thus pushed out, have grown to a few inches, and become somewhat strong, it will be necessary to cut off the branches which are bent down, which may be used again as a cutting. This mode of treatment is applicable to all Conifers." There is little difficulty in rooting cuttings or making rooted layers, but it is next to impossible to get such plants to form a leader and grow erect. *Araucaria cookii* seeds freely at Bangalore; but most of the seeds are sterile, only a few seedlings having been raised.

A soil composed of equal parts of garden loam, leaf mould and sand, intermixed with a good proportion of charcoal, pounded, suits them best.

A. excelsa.—NORFOLK ISLAND PINE.—In its native locality a lofty tree; possibly unrivalled in beauty by any in the whole vegetable kingdom; many thriving trees of good height may be seen in the Calcutta Botanical and Agri-Horticultural Society's Gardens.

A. cookii.—Native of New Caledonia. Grows very well out here. Very similar in growth and general appearance to the last, to which some consider it even superior in beauty, resembling gigantic candleabra. The full-grown tree, as seen in its native home, has been likened to a "well-proportioned factory chimney of great height." In India it has the peculiar habit of leaning towards the east, or slightly south-east.

A. bidwillii.—Native of Moreton Bay; in general character very distinct indeed from the two preceding; with prickly, sparkling dark-green foliage. Some very handsome specimens are to be seen in the Gardens of the Agri-Horticultural Society, and the Calcutta Botanical Gardens.

A. imbricata.—THE MONKEY'S PUZZLE.—Native of Chili; very similar to the last in growth and character of foliage; seems incapable of existing in the climate of this country, as all specimens hitherto introduced have soon died off.

A. cunninghamii.—Native of Moreton Bay; with foliage of a softer and more Cypress-like character than any of the preceding; grows most vigorously here. It has several times borne seed, but this, not having been impregnated by a male plant, consequently, when sown, failed to germinate.

A. cunninghamii glauca.—A silver-coloured variety recently introduced. Pretty when young, but losing the glaucous or silvery tint as growth advances.

"This species," M. Courtins says, "may be propagated from the roots, and affords therefrom nice young healthy plants. Cut the roots, those that are about the thickness of a quill, into pieces four or five inches long, and put them in sandy-peat, keeping the cut level with the surface of the soil."

A. mullerii.—This is a recent introduction, also from Australia, and is, in point of beauty, considered superior to any of the foregoing. The pinnules are gracefully pendant, and of a rich reddish-brown colour. Its greatest merit lies in being perfectly hardy in this country.

A. rulei.—This is also a recent introduction from New Caledonia, and is of noble habit. The leaves are produced in whorls, and are pendulous, of a rich dark green. It thrives to perfection in this country.

It is perhaps needless to add that on the hills of Northern India Araucarias must be grown in the greenhouse to bring them to perfection; for being sub-tropical plants, they are not "hardy" in the way of Cedars and Pines.

DAMMARA.

DAMMAR PINE.

A genus of evergreen, conical, trees of handsome appearance and large growth. Nicholson states that AGATHIS is now the recognized name of the genus. The species cultivated at Bangalore and in other parts of India are :—

D. australis, the Kauri Pine, which attains 150 feet. There is a specimen in the Lal Bagh, Bangalore, nearly 90 feet in height. A somewhat smaller tree produces cones annually. But only a few seedlings have been raised from the latter. New Zealand.

D. orientalis, the Amboyna Pine, a native of the Malaccas, where it yields the transparent resin called dammar. Although not

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so tall-growing as the preceding species, this is also a fine tree. *D. robusta*, the Queensland Kauri pine, is very like *D. australis*.

JUNIPERUS.

JUNIPER.

Small low shrubs, for the most part not more than three or four feet high, of squat, irregular, and not very agreeable form, though the small-leaved foliage with its silvery hue is very handsome, and affords a pleasing variety in the garden. They are very slow growers. Propagated by cuttings during the rains; but more commonly by layers.

THUJA.

ARBOR-VITÆ.

Moderate-sized shrubs, from four to eight feet high. Their well-known, exquisitely beautiful foliage renders them delightful ornaments in the garden. Several unnamed species used to be in the Gardens of the Agri-Horticultural Society, introduced from China by Mr. Fortune. They may be easily raised from seed or propagated by cuttings; but it is observed :—

> "Conifer cuttings cannot be taken indiscriminately from any part of the tree to be propagated. Cuttings from the side-shoots of T. donnian, for instance, make plants that spread themselves out flat, as if they were curucified. Their shape resembles that of the lower branch of a Spruce or Silver Fire broken off, and stuck upright in the ground."*

T. orientalis.—A common and very beautiful species, met with in gardens of most parts of India. *T. O. aurea* (*syn. Blsta*) is a dwarf variety, having a superb golden appearance when it puts forth its fresh foliage.

There are one or two other species; but are so similar in appearance to *T. orientalis*, as to be almost indistinguishable from it.

CRYPTOMERIA

C. japonica.—JAPAN CEDAR.—When of full growth, a tree of immense stature, native of North China. Plants of this handsome tree were introduced some years ago into the Gardens of the Agri-Horticultural Society and are now more commonly met with in this country. Treatment same as for Cypress. The varieties *nigricans* and *variegata* should be tried at cool places like Darjeeling. Also *C. elegans*.

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* "Household Words," Vol. XIII, p. 579.

CUPRESSUS.

CYPRESS.

A genus of trees familiar to all for the beauty and gracefulness of their foliage. They bear seed abundantly, and can be propagated to any extent by this means. The seeds should be sown in February and March ; but as they take some time to germinate, the pots in which they are sown should not be disturbed. Any soil suits them.

Cypress trees do well in the south of India from 3,000 feet upwards. Best growth is attained at 5,000 to 7,000 feet. Seedlings always make the better trees, although it is not unusual to propagate by *gootee* and layers.

C. torulosa.—Native of Bhutan ; trees of this are not uncommon. *C. sempervirens.*—The common variety generally met with in gardens. Native of Italy. This is the upright Cypress often planted in mosque gardens.

C. funebris.—WEEPING-CYPRESS.—Many plants of this species were sent by Mr. Fortune some years ago to the gardens of the Agri-Horticultural Society, where they have thriven well, and may now be met with in almost every garden of any extent. He thus describes the tree as he found it growing in China :—

"About sixty feet high, with a stem as straight as that of a Norfolk Island Pine, and weeping branches like the Willow of St. Helena. It reminded me of some of those large and gorgeous chandeliers sometimes seen in theatres and public halls in Europe." *

Sir J. Paxton further observes :—"This is probably the most interesting coniferous plant yet in cultivation, and must in time displace the Weeping Willow."

Propagation by seed, which it bears abundantly. Also by cuttings. Most easy of culture ; any soil suits it. Other species found in cultivation, mostly in Botanical Gardens, are the Californian Cypress, *C. californica ; C. lusitanica*, the Portugal Cypress, otherwise called the Cedar of Goa ; *C. elegans*, a Mexican species, of tall and graceful proportions ; and *C. macrocarpa*, the Monterey Cypress.

ABIES.

Species of the Spruce Fir are only suitable to the extreme north of India, or the highest altitudes in other parts of the country. *A. excelsa*, the Norway Spruce, and *A. donglasii*, a North American species, are worth trying. *A. webbiana* is a fine tree of the sub-alpine Himalaya.

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* Fortune, "Tea Districts," p. 62.

GSL

SALISBURIA.—(Syn. GINKGO)

MAIDENHAIR-TREE.

S. adiantifolia.—Gingko of the Chinese; in its native region a tree of prodigious stature. Plants were introduced into the Calcutta Botanical Gardens a great many years ago, but remained in a very unthriving state, never attaining to more than two or three feet in height; they have all since then perished. Dr. King informed Firminger. Leaves the size of a man's hand, and, as the name denotes, resembling those of the Maiden-hair Fern; flowers said to resemble those of the common Barberry.

FRENELA.

A few elegant Cypress-like trees have been introduced from Australasia under the above generic name, but the latter is now absorbed in the earlier name Callitris. *F. gunnii* and *F. columellaris* are pretty lawn trees at Bangalore, where they succeed better than most species of Cupressus.

TAXUS.

YEW-TREE.

T. chinensis.—The only species, it is believed, met with here.

PODOCARPUS.

Beautiful evergreen shrubs or small trees, with stiff linear leaves of remarkably slow growth. Propagated ealily by cuttings or layers, during the rains. We have—*P. chinensis*; *P. elongatus*, the more graceful of the two; and *P. latifolia*. They form fine ornaments when planted on lawns.

DACRYDIUM.

D. taxoides.—Native of New Zealand, where it attains a height of 200 feet. It is a remarkably handsome plant when cultivated as a shrub, with a most beautiful filigree character of foliage. Multiplied easily by cuttings during the rains.

D. elatum.—A most beautiful shrub, in foliage like the frond of the Onychium Fern. Cultivated in pots in this country, but rarely met with. Propagated by cuttings.

On the hills they must be grown under glazed shelter.

SEQUOIA.

S. gigantea.—The Mammoth Tree of California, has been tried at Bangalore and failed, the climate being, presumably, too dry and hot for it. It is not known if it has succeeded in the north of India or at hill stations in the south.

CHAMÆCYPARIS.

This rather difficult name really means ground or dwarf Cypress, and now includes some well-known species that were formerly described under the genera *cupressus* and *retinospora*. Of species cultivated in this country, the following are effective for lawns and small avenues.

C. lawsoniana.—Although a very graceful evergreen tree itself forming a perfect pyramid from the ground, it is now surpassed in beauty by numerous improved varieties. Of the latter *Albovariegata, Argentea, Argenteo-variegata, aureo-variegata, erectaviridis* and *gracilis pendula* are the best.

All the above are recommended for hill stations. *C. obtusa* and *C. lycopodioides* are also handsome species from which many beautiful varieties have been raised.

CLASS MONOCOTYLEDONES.

GRAMINEÆ.

THE GRASSES.

THOUGH the list of annual grasses offered by seedsmen is considerable, there are few which, for their ornamental character, are really worth cultivating in this country. Possibly the ones here given may be as many as are desirable, and even these, though succeeding well in the Upper Provinces and at hill stations, Firminger found to thrive indifferently not only at Calcutta, but on the plains generally. Some of the wild grasses on the hills are really beautiful, but it is not worth the trouble to cultivate them in gardens, unless one has a particular fancy for ornamental grasses. Small growing species, such as "quaking grass," should be cultivated in pots. But those of large growth, including the bamboos, are most effective when planted out in groups or avenues.

BAMBUSA.

The decorative use of this ornamental genus is too well known to need comment. A visit to the Royal Botanic Gardens at Calcutta will show what fine effects are produced by the grouping of bamboos.

For a full account of the Indian species, the reader should consult Mr. Gamble's "Bamboos of British India."

B. nana.—A dwarf species which, as Roxburgh observes, makes a beautiful hedge. Propagated by cuttings and seeds.

GSL

B. aurea.—Similar in habit to the above, but golden. Well adapted to the cooler parts of India. The variety *B. aurea variegata* has also been introduced. Propagate from offsets.

B. siamensis.—This graceful species succeeds admirably at an elevation of 3,000 feet.

B. vulgaris.—The golden bamboo of Java. A very striking object in spacious grounds. Succeeds well on the banks of streams and ponds. Also in hollows where there is some moisture all the year round. Easily increased from offsets. Seeds are rarely procurable.

B. tulda.—Medium-sized bamboo of Bengal and Assam.

B. nigra.—In this interesting species the lower part of the stem is nearly black. There is, in the Lloyd Botanic Garden at Darjeeling, an elegant bamboo having bluish purple stems.

B. arundinacea.—The common green prickly bamboo.

DENDROCALAMUS.

D. strictus.—Usually called the solid or male bamboo—the handles of boar spears being commonly made from it. The stems are only solid when grown in dry localities or in poor land.

D. giganteus.—This is one of the largest of the thornless bamboos. In Tenasserim it attains 100 feet in height.

D. hamiltonii.—Another large species of the tropical Himalayas.

Bamboos having angled stems and variegated foliage have recently been introduced from China and Japan.

OCHLANDRA.

O. rheedii.—A large reed, found in marshy ground, commonly known as the quill-bamboo. Suited for margins of ponds.

ARUNDO.

A. conspicua.—This elegant grass is but rarely seen in India, 10 to 12 feet, with large drooping racemes of silky white flowers, which keep in bloom for several months. Well suited to hill stations.

A. donax.—A very ornamental reed, introduced from New Zealand, 8 to 12 feet; requires rather a moist situation.

A. versicolor.—Ribbon grass—gardener's garters. This pretty striped grass, so useful for giving beautiful effect in a bouquet, is commonly planted in Indian gardens. The name "ribbon grass" is also applied, at least in the south, to *Dactylis glomerata variegata*, a much smaller species.

GYNERIUM.

G. argenteum.—Pampas grass. This noble and truly ornamental plant, bearing large terminal panicles, like silverwhite feathers, on stems 10 to 12 feet in height, thrives well in the cooler parts of India, both north and south. Easily propagated from seed.

THYSANOLŒNA.

T. agrostis.—A large ornamental grass with a solid stem, 8 to 12 feet. Leaves rather broad. Flowers in terminal plumes, at first purplish and finally brown coloured. Good for the shrubbery, especially where there is running water.

PANICUM.

P. latissimum.—An ornamental grass from the West Indies.

P. variegatum.—This creeping, variegated grass—striped pink and white, with wavy margins—is one of the most useful plants in a garden. It requires some shade, For small beds, hanging baskets, vases, and a surface covering for large pots or tubs, there is nothing prettier. Usually propagated from runners. Nicholson says : "The correct name is *Oplismenus burmanni variegatus.*"

ZEA.

Z. mays.—Maiza or Indian-corn. A variegated form has recently been introduced for ornamental effect. But it is apt to revert to the green type.

CYMBOPOGON.

C. schœnanthus,—Ginger-grass—*Aghia-ghass.* Common in gardens in all parts of India : cultivated for the fine fragrance of the leaves, which are often used for flavouring custard.

C. martini.—Rausa grass. Native of the hilly parts of the Deccan ; famous for the fragrance of its leaves, from which a fine scented essential oil is extracted. Considered a specific for rheumatism.

VETINERIA.

V. zizanoides.—Kus-kus grass. On account of their fragrance, the roots of this grass are extensively used in the manufacture of door-chicks.

APLUDA.

A. varia and *A. aristata.*—Cultivated in pots; these grasses resemble miniature bamboos. Often seen in the fernery.

DACTYLIS.

D. glomerata variegata.—Variegated cocks-foot grass. Useful for ribbon borders and carpet bedding. Soon becomes a troublesome weed if not looked after. Commonly called ribbon-grass in the south. Perennial.

CYNODON.

C. dactylon.—Doob-grass or Hariali (called Bermuda grass in America). On the plains this is the best grass for making lawns. It is also excellent for making hay. A creeping perennial. Raised from seed and by division of the roots. A weed of cultivation.

BRIZA

B. maxima and *B. gracilis.*—Quaking grass. Very beautiful when bearing their heads of blossom, resembling little heart-shaped lockets suspended from delicate thread-like stems, and moving constantly with the slightest breeze. Sow in October on the plains and in March on the hills.

STIPA.

S. pennata.—Feather grass. A very beautiful grass, its group of stems bearing resemblance, when in flower, to a delicate tuft of whitish feathers, like the tail of the Bird of Paradise. The dried stems, when cut, form a pretty indoor ornament. Sow in October on the plains and in March on the hills.

CYPERACEÆ.

PAPYRUS.

P. antiquorum.—The Egyptian paper reed. Each stem of this large rush terminates in an umbrella-like head or crown, which gives the whole plant a striking appearance. It is grown to best advantage in a tub, or planted out on a small mound, in the middle of a pond of water. Protection from high wind is necessary. Easily propagated from offsets. The plant is also called *Cyperus papyrus*.

CYPERUS.

C. alternifolius.—This Australian rush is commonly cultivated in ferneries and plant houses, where it offers a pleasant contrast to the green foliage of lighter tints. It is a good rockery plant near small pools of water.

C. alternifolius variegatus.—A very attractive variety of the above, stem and leaves being alternately streaked dark green and white, the latter colour often prevailing. Both plants attain 3 to 4 feet and become bushy, Perennial. Propagate by division of the side shoots.

A few of the indigenous sedges are well worth growing in aquatic rockeries.

ERIOCAULEÆ.

ERIOCAULON.

E. quinqueangulare and *sexangulare.*—Grass-like herbs, found in marshes and paddy-fields. The small globular heads of whitish flowers look quaint in a moist part of the rockery.

NAIADACEÆ.

APONOGETON.

A. distachyon.—The Cape Pond Weed. This pretty aquatic should succeed well in the cooler parts of India.

ALISMACEÆ.

SAGITTARIA.

S. sagittæfolia.—Arrow Head. So called on account of the form of the leaf. This perennial aquatic is worthy of a place in garden lakes or ponds. Flowers white, deepening to pale blue or purple at the base of perianth. Indigenous.

LEMNACEÆ.

LEMNA.

L. minor.—Duckweed. Common in still water. Mentioned here as being nearly the smallest of flowering plants. It forms a great part of the floating vegetation of still water.

AROIDEÆ.

PISTIA.

P. stratiotes.—Water Soldier—Water Lettuce. This aquatic is abundant in still water throughout the country. It is like a miniature cabbage. Usually found in old wells. It increases rapidly from offsets. Perennial. Suitable for ponds where there is little wind.

ARISŒMA.

A. speciosa.—The Snake Lily. Of several indigenous species *A. speciosa* is most ornamental. Deciduous tuberous-rooted herbs, which appear above ground with the first good showers. Perennial, 2-4 feet. In one or two species the spathe, which is greenish purple, broadens out and folds over the spadix like the expanded hood of the cobra.

A. fimbreatum.—A species having a beautifully fringed spadix. Has recently been introduced.

SYNGONIUM.

S. podophyllum albo-lineatum.—This climbing aroid, introduced from Central America, is not uncommon in public gardens. When fully grown the leaf is divided into five to seven segments. Midrib and lateral veins immersed in a whitish zone. Useful in plant houses and under shady trees. *S. wendlandii* and *S. auritum* are desirable species of similar habit. Fern-soil is very suitable for the genus.

ACORUS.

A. calamus.—The Sweet Flag. Although not claiming to be ornamental, this popular and sweetly fragrant herb should be cultivated in gardens. It succeeds well in the cooler parts of the country, and is readily propagated from offsets.

A. gramineus.—A smaller species from China, having grass-like foliage.

A. gramineus variegatus.—This is a variegated form of the last. Sweetly pretty, and makes a fine edging for small beds.

AMORPHOPHALLUS.

A. campanulatus.—A tuberous-rooted plant of Indian forests and cultivation. Deciduous during the dry season. A striking object when in full growth of leaf. But it is then a fine-foliage plant only, as the large, fœtid, greenish-purple flowers precede vegetative growth. The round flattened tuber, which is nearly a foot in diameter, should be left undisturbed under the partial shade of trees. It is eaten by many people in India. The flowers appear in a ground-cluster soon after the first showers : being shortly followed by a marvellously rapid growth leaf to a height of 6 to 8 feet. The leaf-stalk is rough and spotted like the back of a chameleon. Leaf-blade umbrella-formed and much divided.

A. bulbifer.—A smaller species, having globular tubers. Flowers pinkish-yellow. The indigenous species are objects of interest in the shrubbery and tope, where there is protection from the direct rays of the sun. *A. kingii*, *A. lacourii*, and *A. rivierii* are also cultivated in Indian gardens.

A. titanum.—Although considered one of the marvels of the vegetable kingdom, this wonderful plant does not seem to have found a place in Indian gardening. It was discovered in West Sumatra by

Dr. Beccari, in 1878. The flower (properly spathe and spadix) is nearly the height of a man. But it has the drawback of being exceedingly fœtid. The growth of the plant is said to be astonishingly rapid.

AGLAONEMA.

Succulent or shrubby perennials with usually variegated leaves. Being mostly indegenous to the Indian Archipelago, they need tropical treatment. They grow exceedingly well in ferneries and foliage plant-houses and are suitable to place on jardinieres in rooms. A porous soil composed of leafmould and loam, with proportionate quantities of sand, charcoal, and old mortar, is suitable to the genus.

The following varieties are cultivated at Calcutta and other horticultural centres :—*A. Lavaliei*, *A. nobilis*, *A. pictum*, *A. picta compacta*, *A. commutatum*, *A. simplex* and *A. pictum gracile* with several others. The last named is considered the most beautiful.

DIEFFENBACHIA.

A very extensive genus of Aroids, natives mostly of tropical South America and the West Indies, but almost naturalized in our plant-houses, where they thrive to perfection. All the species are remarkable for the beautiful colouring of their leaves. When old the stems become gouty, crooked, and often top heavy. Before reaching this stage the plant should be cut up for purposes of propagation—each node of the stem being inserted in sand as a cutting.

There are over 40 varieties in cultivation. The ones described below do well in this country. They are exceptionally good plants for the decoration of rooms.

D. bowmanni.—An old-established plant, with bold, spreading leaves over a foot long and eight inches wide, of a light green picked out with darker blotches. One of the best.

D. chelsoni.—A handsome plant with dark satiny-green leaves marked with a grey band and feathered about one-third across each half of the blade, the surface of which is spotted and blotched with bright yellow-green.

D. jenmanii.—Leaves of a bright shining green, the lateral nerves of which have a milk white band, while the surface is interspersed with whites pots. A very handsome variety.

D. magnifica.—This is perhaps the handsomest of the species. The leaves are ovate, acuminate, 12 to 15 inches long and from 4 to 5 inches wide, dark green in colour, and thickly covered with large irregular, spreading blotches of pale yellow. A perfectly distinct species.

D. regina.—This is a very distinct plant, with oblong leaves of a greenish white colour, blotched with pale green, and having a narrow margin of a darker shade.

D. splendens.—This is a recent introduction. The leaves are oblong, accuminate and recurve gracefully: ground colour a deep velvety bottle-green, with ivory white midrib, and freely blotched with white. A very handsome plant.

D. rex.—A vigorous growing and prettily marked variety.

For those who desire to cultivate a larger assortment of these fine foliage plants, the subjoined list is suggested:

D. amabilis, amœna, amazonica, bausei, banaquimann, braziliensis, carderii, costata, delecta, eburnea, flavo-virens, gigantea, grandis, illustris, imperator, insigni, lanceolata, Leopoldii, maculosa, marmorata, nebulosa, nitida, nobilis, pearcei, picta, princeps, Shuttleworthii, superbiens, triumphans, vittata, volutina and *Weiri superba.*

PHILODENDRON.

Another genus of *Aroideæ* comprising mostly climbing plants with heart-shaped leaves of an ornamental character, which are often more or less perforated. Mostly introduced from tropical America. Cultivation as for Anthurium, propagate from layers and cuttings of the stem. The most beautiful varieties are:

P. carderi.—From S. America. Leaves heart-shaped, of a dark bottle green with satiny lustre, the ribs being picked out with bright green lines; under surface a vinous purple. A most beautiful object when well grown.

P. nobile—Also from S. America. Leaves of a leathery texture, obovate lanceolate. Inflorescence beautiful. Spathe, deep carmine in the lower part and white above, prettily marked by deep-rose stellate spots.

P. wallisii.—A beautiful plant with large heart-shaped leaves, the younger ones of a bright yellow green, spotted by a deeper shade; compact in growth. The other varieties in cultivation are: *Cannæfolium; crinipes; daguense; discolor; grandidens; grandifolium, lindenianum; melanochrysum; pertusum* and *radiatum.*

PHYLLOTÆNIUM.

P. lindeni.—An ornamental aroid, from New Granada. Previously called *Xanthosoma lindeni.* The leaves are sagittate like those of the Caladium, coriaceous in texture, of a dark green, with the ribs and veins of ivory white. Propagated by division of the rhizome. General treatment as for the Anthurium.

SPATHIPHYLLUM.

Dwarf, stemless plants, remarkable chiefly for the ornamental character of their arrow-shaped leaves. The generic name is derived from the leaf-like spathe. Being natives of tropical America, these plants do well in our grass conservatories. A compost of leaf mould, loam, broken brick, sand, and old mortar suits them well. The following varieties are in cultivation:—*S. bensonii*; *S. hybridum*, and *S. pictum*.

SCHISMATOGLOTTIS.

A genus of dwarf, ornamental-leaved plants, mostly indigenous to the country. The leaves, springing from the rhizomes, are heart-shaped and of various colours. Admirably suited for rockeries. They love moisture and shade and do well in the conservatory. Soil as recommended for the last genus, with good drainage. Propagated by division of the rhizome during the rains. The following species and varieties are found in Indian gardens:—*S. cuspata*; *S. lansbergia*; *S. pulcher*; *S. decora*; *S. variegata* and *S. rubelini*.

HOMALONEMA.

Ornamental plants somewhat resembling Alocasias. Mostly indigenous to the country. Treatment as for other aroids. The following varieties are found in the Calcutta gardens:—*H. aromatica*, native of Chittagong: has an aromatic smell. The roots are used by the natives for medicinal purposes. *H. cordatum*, with large heart-shaped leaves and a white spathe. *H. rubescens*, a recent introduction. All do well in the fernery or plant-house.

CURMERIA.

C. picturata.—A stemless plant with broad, spreading, heart-shaped leaves of a beautiful green, having a broad silver-grey band running down the centre.

C. wallisii.—A very handsome plant, with stemless spreading leaves from one to two feet long and a foot broad, with irregular dark green maculations and broad patches of pale yellowish-green, which turn to grey as the leaves mature. A striking object when planted on a rockery covered over by Selaginella. These plants, although requiring plenty of moisture, are very impatient of stagnation and require perfect drainage. Skill is needed to grow them well. Introduced from New Granada.

CHAMACLÆDON.

C. rubescens.—A handsome aroid, from Borneo, with ovate leaves about four inches long by 2½ broad, of a bronzy-green colour, dotted with minute stellate scales on the upper surface, and of a

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dull wine-red colour beneath. A soil composed of three parts leaf-mould, one part old loam, and the usual drainage ingredients of crocks, sand and old mortar, will suit the plant. It does best during the steamy months of the year, being a lover of moisture. Propagated by division of offsets.

ARUM.

A. pictum.—Grown in a pot, is a beautiful plant for the decoration of a verandah. The central portion of the large, arrow-headed smooth leaves is of a pure, pale rose-colour, losing itself gradually into the dark verdant-green of the edges. The leaves die down in the cold weather. It puts forth its flowering spathe in April, which is of a pallid green colour, and of no interest. To develop the leaves to their full perfection of beauty, it requires a good light soil, rather rich, and an abundance of water and shade. Easily propagated by offsets of its roots.

A. dracunculus.—A Cape rhizomatous plant, the principal beauty of which consists in its smooth, upright bright-green stem, strangely spotted and mottled with white like a snake; bears in March a large, chocolate-red spathed flower, emitting an intolerably offensive smell. It blossomed with Firminger the first year of its being brought from the Cape; and the rhizomes produced fine plants a second season, but after that perished.

The leaves die down in April; and the same mode of cultivation, in every respect, is suited to this plant as that recommended below for the Richardia.

A. italicum.—A deciduous arum, from the Channel Islands, 2 to 3 feet.

A. maculatum.—Lords and Ladies or Cuckoo Pint. A good plant for the hills, where it grows luxuriously.

ALOCASIA.

A genus of plants that come into popular favour on account of the rich colouring of the leaves of many of the later introductions. They are very easy of cultivation, and for this reason are a great acquisition to the plant-house, and for decorative purposes generally. A soil composed of leaf-mould and sand in equal proportions, with two parts of old mortar or concrete and a little garden loam, suits them admirably. Drainage must be thorough, or they will perish. Being tuberous-rooted, are easily increased by separating these at the time of potting, in March and April, after the winter's rest. The stems should be allowed to die down in the winter, by withholding water about the middle of November. This applies to the plains of Upper India and the hills. In Lower Bengal they sometimes grow as perennials; but even there it is advisable to allow the stems to die down. Shade and moisture are necessary to bring them to

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from seed from the Cape, and was so fortunate as to have the plant in blossom two years from the time of sowing. Sir J. Paxton's directions for the cultivation of it in Europe apply equally well to this country.

"In potted plants the leaves generally begin to decay about May, when move the pot into the open air, and give plenty of solar light, and only sufficient water to prevent the leaves from dying off suddenly. When the leaves are completely withered, remove to where it can be preserved from wet. Sprinkle the soil occasionally to prevent it from becoming dust dry. In November pot it, and water more liberally. Soil, sandy loam, with slight admixture of leaf-mould and rotten manure."

While in vigorous growth put the pots in pan-feeders, continually supplied with water, in a situation where the plant may have as much light as possible, short of absolute sunshine, which would turn the leaves brown. It blossoms at the end of March. During the rains the dormant rhizomes are very apt to rot; therefore, if they are kept wet at all, they are better preserved perhaps by being exposed continually to the rain than by being subject to the state moisture of any covered place. It is said to "grow as an aquatic, placed in its pot at the bottom of a pond not deeper than three feet." Propagated easily by division in October when the plants are re-potted. Much used for church decoration in the south of India, where the plant grows luxuriantly at hill stations.

POTHOS.

A genus of ornamental-leaved, tropical plants of epiphytic growth; very easy of culture in our grass conservatories. A soil similar to that recommended for Ferns suits them best. Planted in pots, and allowed to climb up a pole or trellis, they look remarkably handsome. They should not be used in place exposed to the direct sun, *e.g.*, walls of unshaded buildings. They propagate themselves, as wherever the stem touches the soil, roots are thrown out from the joints. Cuttings also strike readily in any soil. The following are among the handsomest of the cultivated varieties :—

P. scandens.—A climber, having handsome, lanceolate leaves, two to three inches long, supported on broad-winged foot-stalks; Native of Amboyna. *P. argyrea*—A plant of more dwarf growth with beautiful silvery leaves. *P. flexuosus*—Native of India, with flattened rooting stems, the leaves being alternately directed to the right and to the left, from four to six inches long of a beautiful, shining pale green. Of epiphytic growth, and well adapted for covering walls. *P. aureus*—An extensive climber, having heart-shaped acuminate leaves of a dark green blotched with gold A rather handsome plant. *P. macrophylia* is a large climber, with leaves much larger than any of the preceding. *P. celatocaulis* is a recent introduction, and is perhaps the handsomest of the species.

P. (*Syn. Scindopsus*) *gigantea*—A huge, climbing epiphyte, with immense leaves of dark polished green. Best grown on a large tree, upon which it hangs like a splendid curtain, when it has a truly magnificent appearance.

ANTHURIUM.

Plants of more or less epiphytal growth, and forming one of the handsomest and most striking features of our plant houses, with their immense ornamental leaves. They are easy of culture; the soil recommended for Ferns suits them best. They love plenty of moisture with thorough drainage. Shade is essential to bring them to perfection. They are at their best during the rains. Propagated by cuttings during the rains in pure sand under a bell glass, or any substitute for one. Can also be raised from seed, which many of them bear abundantly. During recent years, many beautiful species have been introduced; while the total number now in cultivation exceeds 50 different varieties.

The following are among the most beautiful:—*A. Andreanum*—Native of America; a beautiful object, with its heart-shaped flower spathe of a brilliant, shining scarlet, and having an irregularly corrugated surface, like the cartilage of the ear. The spadix is white and yellow, and the plant remains in bloom for nearly three months. *A. crystallinum*—A noble-looking plant, remarkable only for the beauty of its leaves, which attain a large size under favourable conditions. They are heart-shaped, of a deep, rich velvety green, the venation being picked out with bands of crystal white *A. crystallinum* var. *Williamsii*—An improved variety of the last named, with larger leaves and better marked. *A. Chelseiense*—A hybrid variety, obtained by crossing *A. Andreanum* and *A. Veitchii*. The leaves resemble the last named. The spathe is heart-shaped, 5 by 3½ inches, of an intense shining, rich crimson, having white spadix tipped with yellow. A beautiful species. *A. Ferrierense*, a cross between *Andreanum* and *ornatum*. Flower spathe of a bright rose colour. *A. grande*, as the name implies, a large species, with immense leaves, broadly heart-shaped, of a light green, having a shiny, velvety appearance. *A. Harrisii pulchre*, native of Brazil, with beautiful, variegated leaves, heart-shaped, and rounded at the base. Pale-green, flecked with silvery variegation. *A. insignis*, from America, a striking species, with tri-lobed leaves of a lively green, and having a bronzy hue when young. *A. macrolobum*, a hybrid variety, with short erect stems, and leaves of dark green with pale ribs, a handsome-leaved variety. *A. magnificum*, one of the grandest of the species, an old favourite. *A. scherzerianum maximum*, a splendid variety with lanceolate cordate leaves, producing immense flower spathes over nine inches long and four broad, of a brilliant scarlet colour, with a twisted spadix. *A. splendidum*, a distinct and striking variety from tropical South America. The leaves are cordate,

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with irregular surface. The course of the nerves marked by a broad, band of deep velvety green, the intervening spaces being of a pale yellowish green. The surface is scabrous, the portions between the ribs having a bulgy and quilted appearance. A plant of fine habit, and highly ornamental. *A. triumphans*, from Brazil ; an erect growing variety, with heart-shaped leaves of a bright green colour, and ribs of paler green. *A. Veitchii*, from Columbia, a striking plant with immense, ovate-oblong leaves, two to three feet long and 18 inches broad. Coriaceus in texture, and of a deep green with a glossy metallic surface when fresh expanded. The nerves are arched and deeply sunk, giving the leaves a wavy appearance. *A. Warocqueanum* —This is regarded as by far the grandest of the ornamental-leaved varieties. The leaves attain a length of over two feet, and eight inches wide : are of a very deep velvety green, the mid-rib and nerves being picked out with white. The above will suffice for any ordinary collection, but the following list contains most of the other varieties in cultivation in this country. They are all more or less ornamental :—*A. acaule ; Barteri ; Dechardi ; Deckii; floribundum; Gilesoni ; giganteum ; glaucescens ; Hookerii ; hybridum; Kalbreyeri; leuconearum; margaritaceum ; Miquieleanum ; nymphæifolium ; ornatum ; pedato radiatum; reflexum; regale; Roezlei; Species de Petropolis ; subseqnatum ; Trilobum* and *Walniewi.* See also *Carneum ; Andreanum flore-albo ; Scherzerianum andegavense ; S. Woodbridgei* and *Chantrierl.*

TYPHACEÆ.

TYPHA.

T. Elephantina.—ELEPHANT GRASS—This large grass or bull rush, with its small, monœcious flowers gathered into dense, brownish spikes at the end of a long stalk, affords a striking object for the aquatic garden.

Propagated by division of the roots.

T. angustifolia.—PITH GRASS—A smaller species that can be similarly used.

PANDANEÆ.

PANDANUS.

P. ororatissimus.—THE SCREW PINE.—*Keora Këtkee.*—A large shrub 15 to 20 feet. Indigenous, and common in swampy places : named in reference to the curious screw-like arrangement of its long, spine-edged, sedge-like leaves on the summit of the stems. It extends over a large space by sending down aerial roots from its branches. Blossoms during the rainy season with panicles of large white, sheath-like leaves, enclosing spongy-looking bundles of closely packed minute flowers, Roxburgh says :—

"It is the tender white leaves of the flowers, chiefly those of the male, that yield that most delightful fragrance for which they are so universally and deservedly esteemed. For of all perfumes in the world it must be the richest and most powerful."

It appears to thrive best in low, swampy ground and hence is admirable for the edge of tanks and ponds, or for islands in the middle of tanks and ponds. Occasional flooding does not harm it. Where a garden is of extent large enough to admit it, the exquisite sandalwood-like perfumes of its flowers renders it very desirable. Propagated readily by cuttings put down in the rains. In rather wet situations these plants can be grouped with grand effect. Such grouping may be seen in the Royal Botanic Gardens at Calcutta. When growth is vigorous, the variegated plants are apt to become green. But when grown in poor soil, or stinted of water, such is not the case. The variegated forms are also at home when cultivated in tubs and large pots.

Some of the dwarfer kinds in cultivation for decorative purposes are ·*P. bifarcatus ; gracilis ; moschatus ; pygmæus ; utilis ; variegatus, Veitchii, Candelabrum Variegatus, Houlletii, Neterocarpus* and *graminifolius*.

CYCLANTHACEÆ.

CARLUDOVICA.

C. Drudei.—A plant introduced into this country from Columbia. It resembles a fan palm, with its handsome, deep-green, lustrous leaves, and is a striking object in a conservatory. It is a species of this genus, *C. Palmata*, which yields the straw or fibre out of which the well-known Panama hats are made, See also the species *rotundifolia* and *Wallisii*.

PALMACEÆ.

PALMS.

For general decorative purposes Palms take a prominent position, and no garden collection is complete without them. In fact, in recent years they have risen greatly in popular favour. Their cool and delightful appearance when in health, and the tropical air they impart to a garden or plant house, have made them universal favourities. Many of the grandest species only retain their beauty and usefulness for decorative purposes up to a certain age, after which they become somewhat unwieldy unmanageable ; but during the period that they retain their dwarf growth, they amply reward the trouble and care bestowed upon them.

Many of the Palms are natives of this country, but as a rule the most beautiful specimens come from various parts of the tropical world, being widely distributed. To grow the latter to perfection, a grass conservatory is necessary on the plains, and a hothouse on the hills. In the tropical gardens of Madras, the fernery is often supplemented, or altogether replaced by the palmery, which is a pleasant feature of gardening.

They are all more or less easy of cultivation. A soil composed of leaf-mould, sand, a little well-decayed cow-dung and common garden soil, in equal proportions, will suit them admirably. Drainage must be thorough, or they will damp off. For the common species, scarcely any care is necessary.

Nearly all Palms bear seeds freely, and are, therefore, easily propagated by sowing the seed, chiefly during the rainy months. They sometimes take a long time to germinate, and for this reason any pot in which Palm seeds have been sown, should never be neglected till a whole year has passed away. The present writer has known seeds to take three years. Immersion for a few hours in water, a little below boiling point, helps to soften the outer covering of the hardest seed.

The following list will be found to contain, it is believed, nearly all the species worth cultivating out here. Of course, there are many species in Botanical Gardens which it will be difficult to procure elsewhere. These have necessarily been left out for obvious reasons.

ARECA.

PINNATE-LEAVED.

1. *A. Oleracea.*—CABBAGE PALM—Is, when about eight or ten feet high, the handsomest by far of all the Palms. Nothing indeed can surpass it in stateliness and elegance, the only part of the stem visible above the earth being the long, smooth, bright-green, gracefully-formed portion just below the fronds. When the trunk grows up and displays itself at its full height, the beauty of the Palm is mainly gone.

2. *A. catechu.*—BETEL-NUT PALM.—Soopâri.—This by many is considered the most graceful and elegant of all our Palms. It has the merit of being one of the most slender, and may, therefore, be admitted into gardens of but moderate extent. Mr. Markham observes:—

> "I have seen Palm-trees in the South-Sea Islands, many kinds in the forests of South America, and in India; but of the whole tribe the Betel-nut Palm is certainly the most elegant and beautiful. Dr. Hooker likens it to an arrow shot from heaven, raising its graceful head and feathery crown in luxuriance and beauty above the verdant slopes."*

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* "Travels in Peru and India," p. 349.

The more recent introductions are : *A. aurea*, with golden stem ; *A. Baueri* ; *crenata* ; *disticha* ; *gracilis* ; *horrida*; *lutescens*; *Madagascarensis* ; *triandra* ; *rubra*, and *sapida*, all well worthy of cultivation.

ARENGA.

PINNATE-LEAVED.

A. saccharifera.—THE SUGAR PALM.—A beautiful and magnificent Palm, throwing up erect from the sides of the trunk its enormous, shining, black-green leaves, which take a graceful, plume-like curve towards the summit. This has a fine ornamental effect when grown by the entrance-gate to a garden. *A. obtusifolia*, somewhat different ; and *A. Wightii*, a beautiful species, lately introduced.

BORASSUS.

FAN-LEAVED.

B. Flabelliformis or *Flabellfer*.—THE PALMYRA—On the plains of Southern India this tree is a familiar object. Fans are commonly made from the leaves. One of the hardiest palms for tropical India.

CARYOTA.

PINNATE-LEAVED.

C. sobolifera.—Grows with a group of stems in the manner of a Bamboo, and bears curious leaves of the size of a man's hand, which have been aptly likened to a fish's tail. A small clump kept within bounds would, no doubt, have an ornamental effect.

C. urens.—Is the Wine Palm of Ceylon, and a splendid object in a garden. It is often called the Fishtail Palm, and sometimes (mistakenly) the Sago Palm. It is common to many parts of India, and bears seeds abundantly.

CALAMUS.

RATTAN.

PINNATE-LEAVED.

Bĕl

Some of the different kinds of Cane are pretty when young, but are of far too rambling a habit to be adapted to a garden. The most graceful being *C. Roxburghii*, a handsome, hardy species, and *C. ciliaris*, a dwarf, erect-growing species, very beautiful when well grown, and admirably adapted for pot-culture.

LIVISTONA.

FAN-LEAVED.

L. Mauritiana.—A beautiful Palm, and a truly delightful ornament when, as it is occasionally seen, grown as a young plant in a large flower-pot. The way in which the broad, graceful, plume-like leaves overlap one another and dispose themselves, renders it eminently handsome. When large it resembles very much the common Târ tree *L. australis*; *Hoogendorhfii*; *rotundifolia* and *Sinensis* are recent introductions, and are splendid objects in a plant-house.

CHAMÆROPS.

FAN-LEAVED.

C. Martiana.—Very beautiful for its leaves, which are borne on long footstalks, and are fan-formed, with the ribs projecting like spikes to a great distance all round from the body of the leaf.

C. Fortunei and *humilis* are both well-known species, and remarkably handsome when young.

ASTROCARYUM.

PINNATE-LEAVED.

A genus of the tribe Cocoineœ, natives of tropical South America, and represented in this country by a single species, *A. argentium*, which is a striking object, with its large pinnate leaves, having a silvery hue. Being an exotic, it cannot be grown outside of a grass conservatory.

CEROXYLON.

PINNATE-LEAVED.

Native of tropical South America. The variety in cultivation is *C. niveum*, and is a beautiful object when well grown. The *C. andicola* is the Wax Palm of New Granada, but cannot be got to grow out here.

COCOS.

PINNATE-LEAVED.

Of recent years many additions have been made to this family, which is represented in this country by the well-known coconut palm. The new varieties are dwarf and very handsome ornaments, the most elegant being *C. Weddelliana*, with its slender, erect stems, and gracefully arching leaves, of a rich green. *C. plumosa* is a native of brazil, with plume-like leaves of dark green; a most attractive palm. *C. campestris*, *flexuosa* and *nucifera aurea* (the King Coconut), are all worthy of a place in a plant-house.

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CORYPHA.

FAN PALM.

Talipot.

A genus of tropical fan-leaved Palms, mostly natives of Asia. They grow to a great height, but, when young, present a most striking appearance with their immense leaves : C. *umbraculifera* is a native of Ceylon and the Malabar Coast, where the leaves are used for a variety of purposes. The plant at maturity produces a great terminal shoot of flowers and then the whole tree dies. *C. Australis* is of smaller growth, and of decidedly ornamental character ; it is from South Australia. *C. elata* is a native of this country, and grows to a height of 150 feet ; but very ornamental when young.

DÆMONOROPS.

PINNATE-LEAVED.

This is another name for the great Calamus family ; in fact it may be regarded as a synonym only as they are all usually classed as Calamus. The most distinguishable variety is the *D. fissus,* which is of somewhat dwarf growth, and having a handsome appearance when young.

DICTYOSPERMA.

PINNATE-LEAVED.

This is a synonym for the large family known as Areca, and by some botanists classed as a separate genus. *D. alba,* known as such, is a handsome Palm, the leaves having a silvery appearance of times.

DIPLOTHEMIUM.

PINNATE-LEAVED.

A genus of Brazilian Palms of recent introduction, and remarkable for being nearly stemless, for which reason they are desirable for pot culture. The variety met with in cultivation in this country is *D. Martimum,* having the under part of the leaves of a silver hue.

EUTERPE.

PINNATISECT.

Very graceful palms ; natives of tropical South America, where they form a striking feature of forest scenery, growing in large clumps. They love moisture and shade, and will not thrive where these conditions are absent. When young, with their slender, cylindrical stems surmounted with a tuft of fine bright-green leaves, they present a most handsome appearance. *E. edulis*, cultivated here, is the Assai Palm of Para (also known as *Oreodoxa Sancona*), and an acquisition to the plant-house.

GEONOMA.

PINNATE-LEAVED.

A genus of very handsome Palms of dwarf growth and slender, polished stems, all natives of tropical South America. They grow to perfection in our grass conservatories. The most desirable with its variety is *G. gracilis*, a beautiful object for dinner-table decorations with its drooping, polished, green leaves. *G. Carderi* princeps; *pumila; Schottiana*, and *Seemani* are also in cultivation here, and worthy of a place in the plant-house. All love shade and moisture.

HYOPHORBE.

PINNATE-LEAVED.

Handsome Palms, natives of Bourbon and Mauritius, with tall, cylindrical stems and a crown of graceful pinnate leaves. Very ornamental when young. *H. Amaricaulis* is a well-known species, and much resembles an Areca; *H. Verschaffeltii* is a recent introduction of dwarf habit; also known under the name of *Areca Verschaffeltii*. *H. Indica* is a native of this country, and is generally known as *Areca lutescens*. All are easy of culture, and bear seeds abundantly, from which they may be readily propagated.

KENTIA.

PINNATE-LEAVED.

A handsome family of Palms, native of the Malayan Archipelago, Norfolk Island, and New Zealand. In general appearance they do not differ much from Arecas, and are only distinguishable from them by not having the nutmeg-like structure of the seed of true Arecas. About half a dozen species are in cultivation in our gardens, chiefly in grass conservatories. The most desirable varieties are *K. MacArthuri* and *Belmoreana, K. Australis*; *Macrocarpa*; *Fosteriana*; *gracilis*, and *Wendlandiana* are also worthy of a place in the plant-house.

KORTHALSIA.

PINNATE-LEAVED.

This is a name given to about half a dozen species of Palms which are, however, so closely allied to *Calamus* as to be hardly disinguishable from them in general appearance and habit of growth. They are natives of the Indian Archipelago, mostly climbers, and a plant or two of *K. Junghulmi* seen growing in Calcutta by Firminger, struck him as being worthy of a place in a collection of Palms.

LATANIA.

FAN-LEAVED.

A family of ornamental Palms, with fan-shaped leaves, natives of South Africa and the Islands of Bourbon and Mauritius ; rather difficult to grow successfully in this country. They grow to twenty feet high. *L. Commersonii (syn. L. rubra)* is a handsome species with red stem, and rich, shining, bronzy-green leaves ; *L. aurea, Borbonica* and *glaucophylla* are also well worth cultivating.

LICUALA.

FAN-LEAVED.

A genus of majestic Palms, mostly natives of the Indian Archipelago, and thriving very well in this country. *L. peltata* and *palmata*, with their fan-shaped leaves having lacerated edges, have a fine effect when well grown. *L. grandis* (now known as *Pritchardia grandis)* found in Borneo and the South Sea Islands, only recently introduced, is perhaps the grandest Palm in cultivation. Nothing can equal it in majestic beauty, with its immense rounded, lace-edged leaves of a bright polished green, growing out of a central base and forming a cluster not easily forgotten. Fortunately, they are all easy of a place in the plant-house. Seeds abundantly.

MARTINEZIA.

PINNATE-LEAVED.

South American Palms of somewhat dwarf growth, remarkable for the spines with which the cylindrical stem and leave-stalks are armed. *M. caryotæfolia* is perhaps the only one of the genus worthy of a place in the plant-house. Seeds abundantly.

DRYMOPHLŒUS.

PINNATISECT.

A recent introduction, and a remarkably handsome genus, represented here by *D. Singaporensis*, with its slender stems and rich green leaves on smooth green petioles, of drooping habit. Being a native of Singapore, from which place it has been introduced, it thrives to perfection in a grass conservatory. During the rains it presents a strikingly handsome appearance with its bunches of deep purple coloured fruit. Easily increased by seed.

OREODOXA.

PINNATE-LEAVED.

A genus of remarkably handsome Palms, natives chiefly of tropical South America and the West Indies. One of the species, *O. oleracea* described elsewhere as *Areca oleracea* (by which name it is generally known) is almost naturalized in this country. Beautiful avenues of it are to be seen in the Calcutta Botanical Gardens. Two other varieties of much beauty, viz., *O. acuminata* and *regia* are in cultivation in Indian gardens. *Oreodoxa regia* has a peculiarly bottle-shaped trunk when young, which straightens out as the plant grows older. In both Bombay and Calcutta this species thrives well, and also grows satisfactorily in Poona and in many parts of India with moderate rainfall and where frost is not serious.

PHŒNIX.

PINNATE-LEAVED.

A genus of ornamental and economic Palms, including among its members the Date Palm (*P. dactylifera*), and Sugar Palm (*P. sylvestris*). Of those suitable for decorative purposes, *P. rupicola*, native of this country, is the handsomest and most desirable on account of its dwarf and elegant growth, the leaves drooping and falling over gracefully; and being very easy of culture, whether indoors or out-of-doors, is an acquisition. Easily raised from seed. The other varieties cultivated here are *P. acaulis*; *reclinata*; *rubricaulis*; *Senegalensis*; *paludosa*, and *Zeylanica*; all more or less ornamental objects in a collection.

PINANGA.

PINNATISECT.

The Palms known under this name now include some of the handsomest in cultivation. They are mostly natives of the Indian Archipelago. The generic name has undergone four different changes: *P. maculata* is the mottled palm, and is unique in appearance; *P. spectabilis* is a well-known species, having dark-green petioles mottled with light green, the under surface of the leaves having a silvery appearance; while *P. Veitchii* and *Sanderiana* have only lately been introduced; but they are of remarkable beauty and grace. They all seed freely.

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PRITCHARDIA.

PALMATISECT.

This genus, closely allied to *Licuala*, contains two grand Palms-- *P. grandis* and *pacifica* ; the first of which has been described under *Licuala*, while the second resembles it much in general appearance, but is not so imposing an object. They are nearly all natives of the Fiji Islands and the Indian Archipelago. There are two other varieties in cultivation, viz., *P. Chinensis* and *filifera*, both handsome species. They take a long time to bear seeds, but these can always be imported. All the species thrive excellently in grass conservatories.

PTYCHOSPERMA.

PINNATE-LEAVED.

Handsome Palms, natives of the Indian Archipelago, and thriving remarkably well in our grass conservatories. They are closely allied to Seaforthia, which they resemble. One of the most elegant is *P. Alexandræ*. There are several other species, but only *P. alba*, besides the above, is cultivated here, so far as Firminger was able to ascertain.

RHAPIS.

FAN-LEAVED.

Dwarf, ornamental Palms, natives of Eastern Asia. The leaves are fan-shaped, and grow in dense tufts, deeply cut into segments. The stems are reed-like and polished green. The old, well-known species, *R. flabelliformis*, is a native of Southern China and is called the Ground Rattan Palm ; *R. humilis* is a recent introduction, and a desirable acquisition to our plant-houses. Both seed freely, and may be thus easily increased.

SABAL.

FAN-LEAVED.

A genus of noble-looking Palms, natives mostly of Southern North America ; some of them are found in the West Indies. They are dwarf in growth, and very ornamental, having fan-shaped leaves. *S. Adansoni* is a North American species, while the other variety cultivated in this country, *S. umbraculifera* (*syn. Blackburniana*), comes from Jamaica. Some of these Palms throw up suckers which can be separated and will form nice plants. They grow well in our grass conservatories.

SEAFORTHIA.

PINNATE-LEAVED.

A family of very ornamental Palms, comprising about thirty species, principally natives of Sumatra, Java, Borneo and other Islands of the Indian Archipelago. One species, perhaps the handsomest, *S. elegans* (*Syn. Ptychosperma Cunninghamiana*), comes from Australia. It is a striking ornament in our grass conservatories. *S. robusta* is another fine species; and, being of dwarf growth, is a very desirable variety to have. The two named here are perhaps the only ones that should be admitted into an ordinary collection.

STEVENSONIA.

S. grandifolia.—One of the handsomest Palms in cultivation, the genus being represented by this one species, which is now known under the name of *Phoenicophorium Sechellarum*. It is a native of the Seychelles Islands. It is a stemless Palm, from the base of which spring copper coloured stalks studded with black spines. The leaf blade is wedge-shaped, of a beautiful bronze hue, and spotted. When young, the leaves are very handsome, being of a rich cinnamon-brown colour. Grows very well in a grass conservatory.

THRINAX.

FAN-LEAVED.

A genus of West Indian Palms, the species differing widely in general appearance; not particularly ornamental, but a few of the recent introductions are worthy of cultivation. *T. argentea*, the Silver Thatch-palm of Jamaica, is an old and well-known species, having large, fan-shaped leaves; *T. graminifolia* has slender, grasslike leaves; *T. elegans* and *T. Barbadensis* are the most ornamental of the species; *T. glauca* and *parviflora* are also worth cultivating.

VERSCHAFFELTIA.

This genus is represented by two species, introduced from the Seychelles Islands; both handsome and distinct Palms. The species known as *Regelia Majestica* is one of the finest ornaments in a Palm collection. *V. splendida* (*R. princeps*) is a dwarf, slender plant and well worth a place in any collection.

PLECTOCOMIA.

PINNATE-LEAVED.

P. Assamica.—A climbing Palm, much resembling the cane (*Calamus*), and armed with formidable spines and long whip-like tails, to which are attached claws to enable it to hold on to other trees upon which it supports itself. It is a native of the Assam hills. Not particularly ornamental.

DESMONCUS.

PINNATE-LEAVED.

A genus closely resembling *Plectocomia* in appearance, habit, and general characteristics. It inhabits tropical South America. *D. major* is sometimes admitted into the grass conservatory.

COMMELINACEÆ.

TRADESCANTIA.

Spiderwort.

A genus of fine-foliaged plants of low growth. Hardy, well adapted for rockwork and carpet-bedding. *T. Zebrina*, a synonym of *Zebrina pendula*, is a pretty basket herb. It is also useful for covering the surface soil in large pots or tubs. Being of a decumbent habit, it spreads quickly under shade, and roots from every node.

T. discolor.—A common garden plant of 1 to 2 feet, with sessile-lanceolate leaves of a deep verdant green bordered with crimson. Flowers small, white, and half concealed among the bracts ; see also *T. multiflora*, *T. Warscewicziana*, and *T*, *rosea*.

CYANOTIS.

A genus of pretty weeds, the best of which should find a place in the rockery. They are at their best during the rainy weather, and look extremely pretty when seen in flowering patches of blue, rose or purple, as the case may be. In nature they grow on a very thin layer of gravel over sheer rock and can be utilized in the garden in similar situations. *C. barbata*. *C. cristata*, and *C. axillaris* are well-known species.

DICHORISANDRA.

Ornamental plants of herbaceous growth, very similar to the foregoing in general appearance. *D. ovata* is a native of Brazil, with ovate lanceolate leaves of a purplish, spot-green colour : having stems pea-green, marked with olive bars. Bears large heads of deep-blue flowers. *D. musaica*, *longifolia vitata*, and *undulata* are remarkable for their shining, ornamental leaves.

PALISOTA.

P. Barteri.—A prettily marked herb, suitable for small pots or rockeries under shade. Propagate from cuttings and side-shoots during the rains.

ANEILEMA.

A. nudiflora.—A perennial herb suitable for rockeries and baskets. Hardy, evergreen, and easily raised by division. *A. sinensis* and *A. bicolor* are recommended.

COMMELINA.

A genus of herbs with mostly pretty, blue flowers. Although the commoner sorts are of a weedy character, a few cultivated forms, such as *C. coelestis, C. illiptica* and *C. deficiens variegata*, are desirable garden plants. Easily raised by division of the side-shoots.

All the plants of the order succeed best in sub-tropical India.

PONTEDERIACEÆ.

A small order of aquatic herbs having mostly sky-blue flowers. *Monochoria vaginalis* and *hastata* are commonly found in tanks and canals. The hardy *Pontederia cordata*, from north America, should succeed at hill stations in the North, as also at Ootacamund and Kodaikanal in the south.

LILIACEÆ.

SMILAX.

An extensive genus of economic and ornamental climbers forming the tribe *Smilaceæ*. The roots of several species afford the true sarsaparilla of shops. They are all shade-loving plants. The small-leaved species *angustifolia, lanceolata* and *salicifolia variegata* are useful for decorating the dinner table. For cultivation in plant-houses, or under the shade of trees, the most effective are *macrophylla variegata, ornata, Shuttleworthii* and *discolor*. Will grow freely in ordinary garden soil which is mellow and properly drained. Propagate from side-shoots during the rainy season.

BEAUCARNIA.

A Mexican genus of curious-looking plants with dracæna-like stem and foliage. Note the gouty-like swelling at the base of the stem and the graceful, pendulous leaves of some species. Grown in light soil in the same way as dracæna, and propagated by cuttings inserted in sand during the rains. The varieties in cultivation are:—*B. recurvata* (formerly called *Pincenictitia tuberculata*) with straight stem and strap-like leaves, sends up during the rains a panicle about a yard long, bearing a multitude of very small, white, fragrant flowers. *B. striata* with plain, glaucous leaves, straight and erect, like an aloe, and bearing small greenish-white flowers on a large panicle. See also *B. latifolia*, *B. longifolia* and *B. rubra.* May be grown on the hills in a glass house. Treatment as for dracæna.

ASPIDISTRA.

A. elatior.—This is a vigorous growing herb from Japan. Although stemless, the stout, oblong leaves are borne on long stalks which raise the plant to a height of nearly two feet.

A. elatior variegata.—In this fine plant, suitable either for pot culture or bedding under partial shade, the leaves are boldly striped green and white.

A. lurida.—A very effective species recently introduced from China. These are fine-foliaged plants requiring the same treatment as Dracæna. The flowers are of little consequence, being mostly concealed by the leaves.

DIANELLA.

A pretty genus of grass-like herbs from Tasmania and New South Wales. Represented in this country by only one or two species. A good rockery plant easily propagated by division when the leaves die down.

D. intermedia.—Flowers whitish. Berries in dark-blue clusters.

D. purpurea.—Native of tropical Asia, of dwarf growth, with grass-like leaves and bearing a drooping panicle of pretty violet purple flowers, which are followed by berries of the same colour. Will grow freely in any porous soil.

ANTHERICUM.

A most useful genus of densely foliaged herbs, mostly introduced from the Cape of Good Hope. The leaves are somewhat fleshy, linear-lanceolate, recurved and spring from the short-rootstock, which is not visible. Loose panicles of white flowers are thrown up from the latter. The variegated forms are excellent subjects for carpet and ribbon bedding under partial shade. They are also well adapted for baskets, vases, and edgings in the plant-houses. Cultivate in rather a poor loam containing somewhat more than the usual proportion of fine sand. Give plenty of water. Divide offsets and sow seeds.

A. Liliago.—ST. BERNARD'S LILY.—Flowers comparatively large, white. Leaves dense, long, narrow and channelled. This will only do in the cooler parts of the country.

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A. Liliastrum.—ST. BRUNO'S LILY—Flowers large, bell-shaped, two inches long, very fragrant, white with a green spot on the tip of each segment of the perianth. A desirable plant for hill-stations.

A. L. Major.—This is the largest and finest species of all.

A. variegatum (Chlorophytum elatum variegatum), also argenteo lineare, of the fourth edition. The leaves of this attractive plant are striped white and pale green.

RHODEA.

R. Japonica.—A curious plant having the appearance of an aroid, even in the matter of its seed-vessel.

Introduced from Japan ; but grows fairly well in our grass conservatories. Bears panicles of white flowers, followed by a tuft of fleshy-looking berries. A light sandy soil with plenty of drainage suits it. Propagated by seed-sowing during the rains.

R. Japonica aureo-variegata.—This is a recent introduction and an improved variety of the preceding with handsome leaves, having a golden variegation.

KNIPHOFIA.

K. aloides.—The flame or red-hot poker flower. When in blossom this handsome plant is a striking object. It is abundant at Ootacamund and Kodaikanal in the south, and is suitable to all hill-stations. The flowers, which are coral-red, fading to orange and greenish yellow, are borne on dense oval spikes, three to five feet. In frosty regions, the plants need some protection during winter. Mulching with bracken would suffice, unless the frost is very severe. It is better to leave the plants undisturbed if possible. There are several other species in cultivation. The old name is Tritoma.

PHORMIUM.

P. tenax.—NEW ZEALAND FLAX.—A large evergreen herb with rigid sword-like leaves. Native of New Zealand. This striking foliage plant can only be cultivated at hill-stations in Southern India. It is seen in great perfection at Ootacamund. *P. tenax variegatum* has the same habit of growth, and is an exceptionally effective plant either upon the lawn or grown in a tub. Will grow in any sandy soil of moderate quality. Propagate from seed and offsets.

DASYLIRION.

A Mexican genus of highly ornamental and remarkable-looking plants, suitable for the lawn and conservatory. The drooping grass-like leaves, supported on a short, thickish stem, are succeeded by a long flower stalk of ten to twelve feet. The unisexual flowers, which are mostly of a whitish colour, are produced on dense cylindrical panicles. *D. acrotrichum*; *D. glaucophyllum*; *D. graminifolium* and *D. recurva* are cultivated in gardens in the cooler parts of the country. Cultivation as for aloes.

LAPAGERIA.

A small genus (monotypic) of Chilian climbers having very beautiful and lasting flowers. The two species here described should succeed well at hill-stations and in Upper India, although they are so rarely heard of.

L. rosea.—A hardy climbing shrub with ovate-lanceolate to subcordate leaves of a leathery texture. Covered for several months with clusters of large drooping flowers of a rich rose-crimson colour.

L. rosea alba.—Similar to the above, excepting that the flowers are pure white. Both are very desirable plants. Propagate from layers of the stem.

PHILAGERIA.

P. Vetchii.—This is the name given to an interesting hybrid produced in Messrs. Veitch's nursery by hybridizing *Philesia buxnolia* and *Lapageria rosea*. The result was a singular combination of both parents in point of foliage and flower. The leaves are neither heart-shaped nor box-shaped; and the flowers are somewhat bell-formed and drooping, of a rosy carmine colour. The plant is easy of culture, and grows well in a light rich soil under the shade of a grass conservatory. Propagate by layers and cuttings of the matured wood.

TULIPA.

TULIP.

Gool Leila.

Firminger was unaware of a single instance of the Tulip having been cultivated with success in this country on the plains. Both when residing at Ferozepore and at Howrah he procured bulbs from England, but on each occasion with the most unsatisfactory result. Some never started at all, and those which did, merely put forth a miserable leaf or two. They grow to perfection on the hills, where the bulbs should be put down in February, in the same way as the Narcissus. Mr. Charles Gray states that the Tulip will not flower at Coonoor, South India, elevation about 6,000 feet.

FRITILLARIA.

Comprises the different kinds of Fritillarias, as well as the old familiar Crown Imperial; all quite unadapted to the climate of Bengal. When at Ferozepore, Firminger procured a selection from

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England. The Crown Imperials had pushed forth long roots by the time of their arrival; but the Fritillarias were still dormant. On being potted they remained in the same condition, never making any growth whatever, and in course of time perished. They grow to perfection on the hills, and should be treated in the same way as the Narcissus.

LILIUM.

Both when at Ferozepore and at Howrah, Firminger made attempts to introduce several kinds of Lily commonly cultivated in England at that time, but on each occasion with most unsatisfactory results. The bulbs do not bear being kept long out of the ground, and are sure to arrive here in a more or less damaged condition. Some were entirely decayed on reaching him; others in a tolerably sound condition never started, and some, one or two only, did so to die off speedily on the approach of the hot season. Many new species from Japan have, however, appeared since then, the introduction of which has proved more satisfactory. The want of success hitherto may be owing to the exhausted condition of the bulbs from which they never recover, rather than from any unfitness of the climate. For it is stated that at the Calcutta Flower-show of March 1868, Mr. G. Livesay exhibited two new kinds of Lilies, unnamed, flowering then for the first time, from bulbs received from the Mauritius three years previously. This is just what happens with the *L. auratum*, brought now to England in such quantities from Japan: many never recover from the effects of the journey, and those that do, take two or three years before they flower. This magnificent species, too, has flowered in Calcutta; but not very satisfactorily. In Upper India and on the hills the case is quite different; and they thrive to perfection if planted in time—on the plains in October, and on the hills in February and March. A light, rich soil suits them.

1. *L. longiflorum*.—A common plant in the gardens about Calcutta. The bulbs are small, but throw up stems about fifteen inches high, bearing in March heads of noble, fragrant, white flowers full six inches long. Several pots of this plant in full bloom afford for the time a most superb decoration for the verandah. The leaves die down about the middle of June, when the pots should be put away in some dry place till October, when the bulbs begin to start again. On the hills pot in March, and when the leaves die down in October, stow away the pots in some dry place. At that time they should be separated and re-potted: the larger ones singly for flowering, and the small ones three or four in a pot, to grow and mature themselves for flowering the succeeding year. When they have started into vigorous growth they require a liberal supply of water, and are the better for the pots being placed every alternate two days in pans of water, as well as for receiving occasional water-

ings of liquid manure. A rather rich soil, in which sand is mixed, suits them.

2. *L. Wallichianum.*—Native of Almora and Nepal. Described by Dr. Wallich as "a very distinct and noble species, with a tall and slender stem, two-thirds of which is thickly furnished with long and linear leaves. The flowers are white, fragrant, extremely large, with a very long and narrow tube which gradually widens into an ample spreading limb ; generally two or three on the apex of the stem."

The several varieties, described in the catalogues of English nurserymen, may all be successfully grown in Upper India and on the hills. The treatment recommended for *L. longiflorum* will suit them all. At hill-stations in South India (Coonoor, Ootacamund, Kodaikanal and Yercaud) there is no difficulty in growing a large variety of Lilies. The kinds most commonly seen in gardens are:—*L. candidum*—Madonna Lily, *L. Mastogon*—Turk's Cap Lily, *L. Longiflorum*—Easter Lily, *L. auratum*—golden-rayed Lily, *L. Harrissi*—Bermuda Lily, and *L. tigrinum*—Tiger Lily. At Bangalore elevation 3,000 feet, rainfall 35 inches, a very few of the hardiest do indifferently. It is comparative coolness, with moisture nearly all the year round, the genus requires. Species from Burma, China and Japan are likely to do well in the Northern and Alpine parts of India.

GLORIOSA.

G. superba.—A slender, climbing plant, with small, narrow leaves and tuberous roots, containing a poison ; native of India, and often to be met with growing wild ; bears during the rains curiously formed flowers of long, narrow, twisted petals, one-half deep crimson and one-half primrose colour on first opening, but afterwards becoming altogether crimson. The flowers, borne in profusion and mingled together in both these conditions, have a most beautiful effect. This jungle plant thoroughly deserves its enthusiastic Latin name. It should find a place in every garden. It has the great advantage that it can be grown in jungly parts of the garden (as well as in beds) and used to light up, with its colour, otherwise dull corners. It dies down in the cold season and lies dormant till the rains. The plant in full vigour is often infested by a caterpillar, by which, if not looked to, in a very short time it is entirely consumed. Abundantly indigenous in the scrub-tracts of Mysore, where it is a pretty sight from September to November.

HEMEROCALLIS.

H. fulva—DAY-LILY.—A common plant in most gardens in India ; bears heads of large tawny-yellow flowers of no great beauty. A variety with double flowers is met with in some gardens, but not

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common. *H. variegata* bears variegated flowers. Put down in bulbs in March, both on the hills and on the plains.

FUNKIA.

F. subcordata.—Native of China; a very handsome, small, pot plant, not uncommon in Calcutta. Leaves cordate, of a dark, pleasant green; bears in August umbels of large, white, sweetly-fragrant, drooping, bell-formed flowers, four inches long, opening of an evening. Propagated by division of the roots in March. They begin their growth in this month on the hills, when they should be repotted in fresh soil. The roots are of a fibrous nature and will not bear being much disturbed or the plants will fail of blossoming. *F. variegata* bears variegated flowers.

AGAPANTHUS.

A. umbellatus—BLUE AFRICAN LILY.—A most noble plant, occasionally, but not often, met with, and not thriving well, in Calcutta gardens; bears upon a long scape, during the rains, a large umbel of large, handsome, azure-blue flowers. Requires the shelter of a verandah, and to be grown in a pot. A light, rich soil suits it. Plant the bulbs in March on the hills, and keep in a green-house. This is eminently a plant for hill-stations, where it succeeds admirably in the ground. *A. umbellatus* var. *albidus* is a recently introduced variety having white flowers. Should be cultivated in pots as the bulbs need wintering (drying off) for a short season.

ALOE.

Dr. Voigt states that there were as many as a hundred species of Aloe formerly in Dr. Carey's garden at Serampore; but that most had died, and that he could enumerate no more than forty-two. About a dozen or fourteen species are to be met with in the Calcutta Botanical Gardens. The Aloe is not to be confused with the Agave, many people use the name Aloe for the genus Agave (which see).

Some two or three have very ornamental leaves and look handsome in pots; these, if left out in the rains, are very apt to perish from water lodging between the leaves, and causing them to rot at the point of junction. A light, porous soil, through which the water given them is soon passed off, is manifestly that best suited to them.

1. *A. Abyssinica.*—A very large species, growing in the open ground in the Calcutta Botanical Gardens, and very showy when in full blossom in January and February, with its large flower-stem bearing innumerable, small, bright vermilion flowers.

2. *A. Indica.*—A common plant throughout the country; leaves thorn-edged, thick, soft, pale-green, crossed with lines of spots; bears dull red flowers. From the peculiarity of its foliage a pleasing variety among other potted plants.

3. *A. intermedia.*—A small, handsome plant, with neat, clean-cut, strap-like leaves, speckled with green and white.

4. *A. nigricans.*—Exceedingly ornamental for its polished, black-green, well-cut leaves, of strap-like form; bears in March flowers varying from pale-green to lurid red.

5. *A. attenuata.*—A small plant with very succulent and curiously crimped leaves; bears in April small, greenish, insignificant flowers.

6. *A. saponaria.*—A small plant with curious, thick, short, succulent leaves, crossed with dotted white lines.

GASTERIA.

G. brevifolia and one or two other species do well on the hills. They are small Aloe-like succulents having terminal racemes or panicles of pretty flowers, usually coloured red or scarlet, the pedicles are also reddish. Good plants for rockwork.

YUCCA.

ADAM'S-NEEDLE.

The species of Yucca known in Europe amount to as many as thirty. The following only are those to be met with in this country.

1. *Y. aloifolia.*—A large plant, common everywhere in India, and familiar for its formidable array of long, hard, flattened leaves, each tipped with a needle-like thorn; bears in the rains countless white flowers, hanging most beautifully, like little bells, from its erect-growing flower-stem. The plant becomes disposed to blossom sooner by having the lower leaves cut away. The leaves, burried in damp earth till their soft parts decay, yield a strong, tenacious fibre, very useful for tying up plants with. Propagated by offsets. There is a variegated variety of this plant, having the edges of the leaves of dull white colour, not particularly ornamental.

2. *Y. gloriosa.*—SPANISH BAYONET.—Distinguished from the last by its leaves being much narrower and spike-like; grows to fair large dimensions before flowering. Bears flowers similar to the last named.

3. *Y. stricta.*—A small plant in the Calcutta Botanical Gardens, never flowering there, and making little or no growth.

ALLIUM.

Comprises several species, bearing umbels of different-coloured flowers with a strong smell of Garlic; most have been introduced, but do not seem disposed to flower here.

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A. fragrans.—A small bulbous plant ; bears in April small umbels of greenish-white flowers, like those of the common Onion, interesting for their heliotrope-like fragrance.

SCILLA.

SQUILL.

A genus of small, bulbous plants, producing flowers somewhat similar to the Hyacinth ; not found to succeed in Bengal, but grow well in Upper India and the hills. Theatment some as for Narcissus. Worth growing on the hills.

ORNITHOGALUM.

STAR OF BETHLEHEM.

Of which there are several species : not cultivated with success here.

O. caudatum.—An uninteresting plant in the Calcutta Botanical Gardens ; bears greenish-white flowers.

MUSCARI.

M. botryoides—GRAPE HYACINTH.—A pretty, diminutive, bulbous plant, distributed abundantly in the United Provinces from the Saharunpore Gardens ; thrives well in the border, and produces pretty racemes of dark-blue flowers, of about the size of Black Currants. Firminger never met with it in Bengal. Plant the bulbs in March.

HYACINTHUS.

H. orientalis—HYACINTH.—By repeated trials it has been well ascertained that the Hyacinth cannot be brought to thrive and blossom, with any degree of satisfaction, in Calcutta or its vicinity. Of the bulbs that are imported some only produce a few leaves, while others, which appear forming for blossom, seem scarcely able to push themselves above ground, and instead of opening all the flowers in the cluster at once, open two or three first, which decay before the remainder expand.

In Upper India, however, their cultivation is attended with complete success. A selection of bulbs procured from England, with very little attention given to them, blossomed as beautifully as they are ever seen to do in Europe. "Can be grown successfully at Ootacamund, but the bulbs last but one season."—*Sir Frederick Price.*

The best bulbs are always of a conical form.—All flat-crowned ones are apt to give off numerous offsets, and rarely, if ever, give good flowers. Also, "small bulbs are of the finest varieties. The size of the bulb has nothing to do with the fineness of the bloom, which is most commonly inversely as the size of the bulb."*

The pot in which a Hyacinth is grown should be eleven or twelve inches deep, the soil a mixture of well decayed cow-manure and leaf-mould, and a very large proportion of sand, and a few wood ashes or small bits of charcoal. Some recommend the bulbs to be planted three inches deep, but this would be to bury one of the principal features of beauty in the plant. The best plan perhaps is to plant the bulb with about a third above the surface of the earth, that the beautiful metallic colour upon it may not be concealed, and then attend to the following directions given by Sir J. Paxton :—

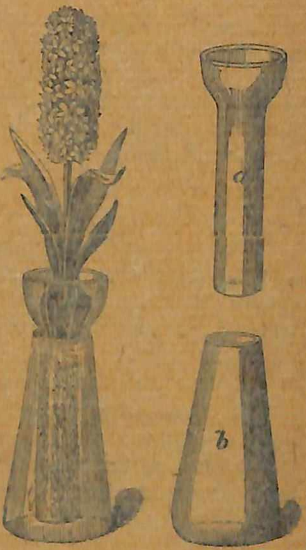

FIG. 24.

"The plant is unable to develop itself with a rapidity proportionate to the moisture it imbibes, when its upper surface is acted upon too immediately by the atmosphere. Hence the propriety of covering the bulbs with some light material. They ought invariably to be started by covering the pots containing them with three or four inches of old bark or half pulverized leaf-soil. A due share of moisture is thus preserved around leaves, bulbs, and roots; and moisture is their vital element in the growing stage. When they reach the surface of the covering, they may be gradually introduced to the full existing measure of solar light, which will speedily restore the colour of the blanched foliage. Another important point necessary to their complete perfection is a large proportion of river or white sand in the soil. Nothing is more prejudicial to them than stagnant water."

They can also be grown in the beautiful Hyacinth glasses to be met with now, filied with water, as illustrated in Fig. 24. The glass should be filled with clean, soft water, with a few pieces of charcoal and a little sand. Cover the bulbs with paper tubes until they start into growth; then expose them to light. *a* fits into *b*, thus allowing

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*Vilmorin's Catalogue quoted in "Gard. Chron." Sept., 1861 21.

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the water to be changed without disturbing the roots. On the hills they come to great perfection, where the bulbs should be planted in February.

LACHENALIA.

Small, bulbous plants, natives of South Africa; for the most part not succeeding in Bengal, though they do well enough in Upper India. Plant in October on the plains, and in March on the hills. Plant in a mixture of two parts loam, one part farm-yard manure, and one part leaf-mould. After flowering, let the bulbs dry and store till next growing season.

DRIMEA.

D. revoluta.—A small pot-plant, native of Africa, with curious lurid-green leaves, covered with round, white spots; bears in May spikes of small dull pink flowers. Plant in February on the plains. Never met with on the hills.

EUSTREPHUS.

E. angustifolius.—Native of Australia; bears pale-purple flowers, but ornamental principally as a small climbing plant of graceful, slender character, and pretty, drooping, grass-like leaves. Propagated by cuttings during the rains.

ASPARAGUS.

1. *A. acerosus.*—Native of Bengal, an erect, herbaceous thorny plant, with needle-like leaves; bears, in the beginning of the cold weather, pure, white, delightfully fragrant flowers. Roxburgh remarks, "a charming shrub." Propagated by division in the rains. Not met with on the hills; but may be grown under glass.

2. *A. racemosus.*—A very thorny, shrubby, climbing plant, very beautiful for its foliage alone, which from a distance has somewhat the appearance of a Juniper; produces in November an unbounded profusion of minute, white flowers, which perfume the air to a considerable distance around.

3. *A. ascendens.*—An erect-growing plant; blossoms in November when it is most exquisitely beautiful, with its graceful spray of minute flowers resembling delicate plumes of silver.

4. *A. plumosus.*—A lovely evergreen climber from South Africa, with smooth stems, and beautiful, minutely divided leaves, having the appearance of plumes. One of the most ornamental leaved plants yet introduced; bears small, white, insignificant flowers. A light, rich soil suits it, with plenty of drainage. Propagated by division during the rains.

5. *A. plumosus nanus.*—An exceedingly graceful variety of the last named, but differing from it in being of dwarf, shrubby habit, and therefore admirably adapted for dinner-table decoration. Very similar to the last in general appearance, and particularly suited for furnishing cut sprays for intermixing with flowers. Treatment same as for the last named. Both the above are successfuly grown in glazed structures on the hills.

DRACÆNA.

This is a genus of plants which included, under the old arrangement, a large number of species; but it has been split up into five different genera by Planchon. As, however, the plants, cultivated for the ornamental character of their leaves, which are remarkable for their beauty, are still popularly known under this old name, it has been considered advisable to retain it here. The plants are easy of culture, and thrive best in a rich, open, limey soil. They are very easily propagated by division; but stem cuttings put down in sand during the rains strike most readily. For pot-culture, or for beds, borders, and dockeries, or for growing in clumps, they are admirably adapted. For dinner-table decoration they are unrivalled.

There are over a hundred varieties in cultivation; the most ornamental of them being of recent introduction. A great many of them are found in Indian gardens. The following list will be found to contain the best types, and includes as many as any ordinary collection need have. The first in point of beauty is:

D. GOLDIEANA, from tropical Africa; quite distinct from any other Dracæna, having an erect slender stem, with the base of the leaves closely clasping it, spreading, being cordate-ovate-acuminate in shape, with a yellowish-green costa, banded with dark-green and silver grey in alternate straight of furcate transverse bands. The back of the unfolded leaves is of a reddish-purple colour. D. LINDENI comes next from Brazil, with elegantly recurved leaves of a deep green, traversed along their entire length with bands of creamy white and shades of yellow and rose. A plant of majestic growth, attaining a height of six to eight feet. D. FRAGRANS VARIEGATA, somewhat similar to the last in habit, only the variegation is more central, while it produces delightfully fragrant flowers. D. BROMFIELDII, from North Australia, is a beautiful plant of dwarf growth, with lanceolate leaves 1½ inches wide, drooping to a point; of a light green, striped and margined with ivory white. D. BAUSEI, one of the highly coloured varieties, of striking habit and free growth. The leaves are four inches wide, of a dark bronze, margined with crimson. One of the best of this type. D. DUFFII, from Australia, of dwarf growth, with erect leaves a foot long and three inches wide of a light bronzy colour. D. MRS. HOSKINS, a hybrid variety, very distinct, of dwarf habit, with leaves twelve inches long and four wide, of a light bronzy

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purple. D. MRS. C. J. FREAKE, also a hybrid very distinct and of moderate growth, leaves recurved, dark bottle-green, striped and edged along their entire length with creamy white and rosy purple. D. THOMPSONII, a beautiful variety of dense growth, the leaves are deep green, bordered with rose, and having a patch of magenta in the centre. It is of handsome appearance, with broad, oblong leaves. One of the best in cultivation. D. VOLUTA, a hybrid of pyramidal habit. The leaves are of stout texture, broad, and volutely recurved, of dark bottle-green, with edge and mid-rib of purple. A beautiful vriety.

The ten varieties described above are perhaps the best in cultivation; although on this point tastes may differ. For those who desire to cultivate a larger number of varieties, the following list is given, from which a selection may be made:—

D. BAPTISTII; BARRONII; CHELSONI; COOPERI; ERNESTII; EXCELSA; FORMOSA; FRAGRANS; GAYII; GLADSTONII; GRACILIS; GUILFOYLEI; HENDERSONII; IMPERIALIS; KRAUSII; LUTESCENS; MAGNIFICA; MAJESTICA; MASSANGIANA; MAURITIANA; METALLICA; MOOREANUS; MRS. BAUSE; MRS. TURNER; NIGRO-RUBRA; NIGROSTRIATA; REALI; REBECCA; REFLEXA; REGINÆ; SEAFORTHII; STELLA; SUPERBA; TRIUMPHANS; TAYLORII; UMBRACULIFERA; VIRGINALIS, and YOUNGII.

CORDYLINE (syn. Dracæna).

1. *C. ferrea.*—A moderate-sized shrub, with long, lanceolate, dark-green leaves, with crimson edges, cultivated in most gardens for the highly ornamental character of its foliage; bears large, compact bunches of very numerous, small rose-coloured, very pretty flowers. Propagated by division, and cuttings in sand during the rains.

2. *C. terminalis.*—SANDWICH ISLAND TEA-PLANT.—A shrub of the same size as the last; ornamental for its foliage, which is principally terminal upon the stems of a rich light, most refreshingly verdant green; bears in March feather-like sprays of numerous small, pure white flowers. Propagated as above.

3. *C. reflexa.*—A shrub of somewhat smaller size than the last and with smaller leaves, of the same form and of a most agreeable green; bears in the hot season yellowish-green, sweet-scented flowers. Propagated same as the last two.

4. *C. ensifolia.*—A very handsome and common shrub in gardens about Calcutta, five or six feet high; bearing on the summits of its stem crowded whorls of noble strap-formed leaves, of a rich refreshing green, two feet long and four or five inches broad from the centre of which spring out, in February, sprays of dense spikes of small white flowers.

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TUPISTRA.

T. maculata.—Roxburgh describes this as a "shrubby caulescent species, native of Sumatra, three or four feet high." Firminger had seen only small plants of it in pots in the Calcutta Botanical Gardens thriving very indifferently. Leaves broadly lanceolate, prettily marked all over with round, white spots.

OPHIOPOGON.

O. Japonicum.—A small, herbaceous plant with grass-like leaves, well-suited for an edging to the border in the way Thrift is sometimes used in England ; bears very numerous small flowers of a delicate lavender colour, upon footstalks of the same colour.

DIOSCOREACEÆ.

The yams belong to a genus of tuberous rooted, usually deciduous twiners, a few of which have beautifully marked leaves. The best are *D. argyræa* ; *D. discolor* ; *D. illustrata* ; *D. multicolor* and *D. vittata*. Planted in a deep loam they thrive well in this country. Train over trellises : propagate by dividing the tuber.

BROMELIACEÆ.

CARAGUATA.

C. Cardinalis.—Indigenous to Central America, Columbia, and the West Indies. Introduced into this country by a Calcutta nurseryman. Grown for the beauty of its leaves. Rather difficult of cultivation. A soil composed of leaf mould, sand and charcoal suits it best. Requires plenty of water, and is seen to best advantage during the rains.

KARATAS.

This South American genus, formerly known as Nidularium, is composed of curious herbs with sessile, variegated, rosulate leaves growing mostly in the form of a bird's nest. Cultivated in the same way of Bilbergia and increased by offshoots during the rains. The varieties found in Indian gardens are :—*K. spectabilis*—showy, *K. crucata*—bloody. *K. fulgens*, and possibly humilis. The leaves of the latter have a peculiar tentacular look about them.

ANANAS.

These are the ornamental-leaved Pine-apples. *A. sativa striatifolia*, the stripe-leaved Pine-apple, is a native of Malacca, and well known in our gardens for its beautiful leaves, which are marked longitudinally with stripes of primrose, red, and deep green. Well suited for pot-culture, in a soil composed of leaf-mould sand, mixed with cocoanut fibre and charcoal. Propagated by division during the rains. *A sativa variegata* is also a handsome plant; while *A. portiana*, a recent introduction, is the handsomest of all.

ÆCHMEA.

A genus of handsome-leaved plants, having strap-formed, undulating, clasping leaves, which bear in August and September, compound spikes of bead-like buds, expanding into unpretending flowers. Cultivation same as Ananas. The two following are in cultivation. *Æ. fulgens*, having broad, thick leaves and flower stems; bears buds of a coral crimson throughout.

Æ. discolor, a plant of slender growth, with flower buds tipped with dark purple, and having very much the appearance of the seeds of Abrus precatorius.

BILBERGIA.

Dwarf, ornamental plants, with thick, succulent, Aloe-like clasping leaves, natives of tropical South America, where they are often found growing on trees, thus showing their epiphytic character. In this country, however, they are generally grown in pots, in a soil similar to that recommended for Ananas. They can also be grown successfully attached to blocks of wood and suspended from the roof of the grass conservatory. They may also be used as a means of adorning old tree trunks. Propagate by suckers after flowering is over. The following varieties are in cultivation:—*B. bicolor*; *tricolor*; *vitata*; *melananlha*; *pyramdalis*; *fermilosa*; *Leopoldii*; *Moreliana*; *oleus*; *Saundersii*; *thyrsoidea* and *zonata*.

TILLANDSIA.

A genus of tropical American plants of dwarf growth, very similar in general appearance and character to the preceding, and epiphytal in habit, many of the species being found growing on trees. They are remarkable chiefly for their leaves, which are of varied colours. If attached to blocks of wood with moss, and kept moist, they thrive to perfection; they may also be grown in pots, and treated in the same way as Bilbergias. *T. musaica* is perhaps the handsomest species in cultivation. The following are some of the best species in cultivation:—*T. Kingiana*; *Lindenii*; *splendens*; *zebrina* and *zonata*. *T. utriculata*, native of Jamaica, has small organs like pitchers of water. Some of the other species, e.g., *T. usneoides*, presents a curious appearance resembling tufts of hair hanging from the branches of trees in Central America. *Tillandsias* are propagated by offshoots and suckers which are thrown up during the rains. The genus *Vriesia* is now absorbed in *Tillandsia*.

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Additional species introduced under the latter name are *T. regina*; *T. Roezlii*; *T. recurvifolia* and others.

PITCAIRNIA.

A genus of plants with sedge-like leaves, bearing during the hot and rainy seasons handsome recemes of large, tubular, brilliant, crimson flowers. Not particular as to soil, though that recommended for Ananas suits them best. Multiplied to any extent by division. The following are a few out of the many species available :—

1. *P. bromeliafolia.*—The largest growing plant of all, and best adapted to the open border ; conspicuous for the white, mealy appearance of the under-surface of the leaves.

2. *P. Olfersii.*—Has broad leaves, and is in most respects similar to the preceding.

3. *P. Punicea.*—A much smaller plant, and preferable to all perhaps for the size of the flowers and the compactness of the racemes.

4. *P. Integrifolia.*—Has narrow leaves without spines on their edge as those of other species have. The recemes of flowers are long, lax, and diffuse, and consequently not so handsome as in some other species.

5. *P. fruticosa.*

6. *P. latifolia.*—Produces a bunch of flowers of a bright red.

7. *P. Altensteinii.*—Bears a thick, short, flower-stalk, supporting long, tubular, yellowish-white flowers, contrasting finely with their bright red bracts.

8. *P. Platyphylla,* a recent introduction.

TACCACEÆ.

An Order of perennial herbs with large, fleshy rootstocks or creeping rhizomes. More curious than ornamental. *T. pinnatifida,* occasionally seen in Botanical Gardens, is the South Sea arrowroot plant. Propagated by division of the tuber.

AMARYLLIDACEÆ.

A very numerous order of bulbous plants, most of which at different periods appear to have been introduced into this country, though but a very limited number have long survived. Some have proved unsuited to the climate, and soon perished. Some have continued to thrive for many years, but without ever producing a flower, and so at last have become neglected and lost. Some few are indigenous to this country, and these blossom beautifully each season without any special care being required in their cultivation.

POLIANTHES.

P. tuberosa—TUBE-ROSE—*Gool-shabu.*—The commonest, perhaps, of any plant, in the gardens of India, and certainly one of the most delightful. Sends up stems usually three feet high; in a soil that suits it, it will grow as high as six feet, bearing hyacinth-like clusters of pure white flowers, which diffuse an exquisite fragrance for a wide distance around. After flowering, the stems should be cut down, and others will spring up in constant succession throughout the year. Propagated by separation of the bulbs, as it may be also from seed, which it produces in abundance during the cold weather. The double flowering variety bears lovely clusters of flowers, but not nearly so fragrant as the single. The stems of this variety require to be supported by stakes, or they are all but sure to fall with their own weight, and then look very unsightly.

GALANTHUS.

G. nivalis.—SNOWDROP.—Is only mentioned to state that though the corms may easily be procured in a perfectly sound condition from Europe, there is not the remotest chance of their ever producing flowers here on the plains, though they succeed very well on the hills.

LEUCOJUM.

L. æstivum.—SNOW-FLAKE.—Bears flowers very similar to those of the Snowdrop. Flowers freely at Coonoor and Ootacamund.

AMARYLLIS.

A genus of beautiful, bulbous plants, thriving to perfection in this country. They have come into popular favour recently, and scores of new varieties of all shades of colour have been raised by hybridization. They are very easy of culture, requiring no trouble after being once planted. In December and January, the bulbs should be put into fresh soil, made up of well-decayed cow-dung, leaf-mould, sand and common garden loam, when they should be lightly watered. As soon as they begin their growths, water copiously, and they will be in full bloom in March and April. On the hills re-pot in March. As soon as they are done flowering, the pots should be removed to a spare corner, where the plants can complete their growth. During the rains the bulbs may be divided and potted off separately. In Lower Bengal, the plants do not die down during the winter; but they do in Upper India and on the hills. Therefore, in the two latter cases, after the plants have finished their growth, they should be allowed to die down by withholding water gradually.

A. Belladonna.—THE BELLADONNA LILY is the typical species, and common in Indian gardens.

A. Josephinæ.—Is from South Africa, whence many of the varieties come.

It would be tedious to give a list of the hybrid varieties, of which there are over a hundred enumerated in the catalogues of English and Indian nurserymen ; but the following may be mentioned as particularly handsome and striking :—*reticulata* ; *Mrs. Garfield* ; *Mrs. W. Lee*; *Empress of India* ; *Dr. Masters* ; *Countess of Dufferin* ; *Colonel Burnaby*; *Clarinda; Fairy Queen* and *Othello.*

A. candida.—A pretty, small species, having grass-like foliage and medium-sized, white flowers. Anthers yellow. Good for edging or in small beds.

ZEPHYRANTHES.

Zephyr Flower, and Flower of the West Wind.

Small plants bearing, when in full leaf, during the rains, beautiful lily-like flowers. one on a scape. A mark should be set in the border where they are grown. or they are liable to be destroyed on the ground being dug up when they are out of leaf. They like a compost of turfy loam with sand and well-rotten farm-yard manure. These pretty flowers are common at hill resorts where they bloom freely after the first rains. Patches on the margin of a lawn. by the side of shrubbery and trees. have a cheerful and brilliant effect. The white-flowered species are occasionally called American Crocuses. *Z. flava* and *Z. Andersoni* are desirable yellow-flowered species. It is not known if they have been tried in the colder parts of the country.

1. *Z. cabinata.*—Has narrow. grass-like leaves. and bears large. rose-coloured flowers.

2. *Z. rosea.*—Has flowers very similar to, but smaller than. the last.

3. *Z. tubispatha.*—Bears pure white flowers, not unlike those of a Crocus.

HABRANTHUS.

A genus of plants producing flowers very similar to those of the preceding, and succeeding well here. as many as seven species being enumerated which blossom during the rains. Any soil suits them, but a light. rich one is the best.

SPREKELIA.

1. *S. formosissima*—JACOBÆA LILY.—Produces large, beautiful, curiously-formed. brilliant, crimson flowers, without tube, borne vertically upon the scape in the manner of a cockade ; a very common plant in the gardens at Ootacamund, and not uncommonly grown in

pots in Calcutta, where it blossoms in the hot and rainy seasons. On the hills it loses its leaves in the cold weather, as it does in Europe; but on the plains it retains them all the year through. The plants, however, would possibly blossom better, if, by withholding water and by exposure to the sun, they were brought for some time into a dormant state. It has been found that the bulbs will flower beautifully merely covered with damp moss and suspended.

S. Dalhousieæl.—Has much broader leaves than the last and bears in April pure white flowers with long narrow petals of not much beauty.

Both the foregoing should be potted in fresh soil, made up of well-decayed cow-dung, leaf-mould, and garden loam in about equal parts, with enough sand added to make the whole porous and gritty. Re-potting should be done in February and March.

GRIFFINIA.

A South American genus of dwarf bulbous plants. Leaves broad, oblong, petiolated and prominently nerved. Treat as for Amaryllis, soil being fairly rich, light and well drained. *G. hyacinthina* is the prettiest of the species and bears a many-flowered umbel of lovely blue flowers resembling the Hyacinth. It is not uncommon in gardens; *G. H. maxima* and *G. ornata* are also desirable plants.

DORYANTHES.

An Australian genus of perennial plants resembling the so-called aloes in foliage and flowering pole; but the flowering stage is usually long deferred in this country. A sub-tropical situation seems to best fulfil the natural requirements of the genus in India. Cultivation as for Agave and Furcræa. Propagated from offsets and seeds.

D. excelsa.—A handsome object for a lawn. Flowers numerous, brilliant scarlet, the size of a Lily.

D. Palmeri.—Also good for a lawn. Flowers reddish, funnel shaped, and lasting.

CURCULIGO.

A genus of tropical Himalayan foliage plants, intermediate in general appearance between broad-leaved grasses and palms. They require the same treatment as the latter, grow freely in the fernery or palm-house and are effective for decoration. The kinds worth growing are *C. recurvata* with its variegated forms, of which *striata* and *variegata* are the best. Can only be grown as a hot-house plant at hill-stations. Propagate by offsets (division of the tubers and scaly corms) and seed.

HIPPEASTRUM.

KNIGHT'S STAR-LILY.

Large bulbous plants (often set down in catalogues under the name of Amaryllis) with long strap-formed leaves which die down in the cold weather, and do not appear again till after the plants have flowered in March. The flowers, borne generally five in an umbel on a scape about fourteen inches long, are large of Lily form, with the jointed divisions of the corolla deeply coloured in such a way as when looked into to present the appearance of a star. The difference between many of them is very trifling. Nearly all thrive to perfection in this country. Dr. Voigt states that in Dr. Carey's garden at Serampore there were formerly as many as seventy-four hybrids, appearing in all their beauty during the hot and first part of the rainy season. They may be grown in very large pots, but are the better for being planted out in beds devoted entirely to them. They require little care in their cultivation ; but removal into a fresh situation every two or three years is beneficial. A light rich soil brings them to perfection.

1. *H. equestre fulgidum*, 2. *H. reticulatum*, 3. *H. equestre majus*, 4. *H. stylosum*—Are common in the Calcutta gardens, and bear flowers very similar to each other, with the limb of the corolla scarlet upon a greenish-white tube.

5. *H. ambiguum*—With flowers nearly white.

6. *H. Johnsonii*.—A very handsome and distinct hybrid, with the segments of the corolla deep crimson, and the tube white.

VALLOTA.

V. purpurea.—A South African bulb, bears, when the plant is in full leaf, flowers of a brilliant scarlet, similar in form to those of the Hippeastrum. It is a shy bloomer in this country, and treated more as a perennial. Sub-species are *eximia*, *magnifica*, *major* and *minor*.

LYCORIS.

This bulb is now included under Amaryllis, and should be treated similarly.

1. *L. aurea*.—Native of China ; bears an umbel of several large golden-yellow flowers, somewhat of a Lily form, in August and September.

2. *L. radiata*.—Native of Japan ; produces in August and September large dull crimson flowers.

NERINE.

A large genus of Cape bulbs, including *N. Sarniensis*, the Guernsey Lily, bearing umbels of beautiful flowers, with their corollas divided into narrow wavy segments. They succeed well in Upper India. Should be treated in the same way as Amaryllis.

CRINUM.

Dr. Voigt in his catalogue enumerated as many as thirty-three species of this genus, exclusive of varieties, besides thirty hybrids and crosses, as cultivated in the gardens at Serampore, and nearly all blossoming in the rainy season. A large portion probably of these are not to be met with now either there or in any other garden about Calcutta. Indeed, between most of them there is so great a similarity that all but a limited few may be dispensed with in any but a botanical garden. Many are natives of this country, and perfectly hardy, needing no particular care or attention after being once planted. A rich soil, however, suits them. Can be increased to any extent by separating bulbs at the beginning of the hot season, when they should be re-potted.

1. *C. amœnum.*—Native of Sylhet, in muddy creeks; has narrow leaves a foot or two long; bears in April and May, a scape about a foot long with an umbel of four to six large white flowers.

2. *C. defixum—Sook-durshun.*—Has very narrow leaves from one to three feet long. Scape with umbel of six to sixteen large white flowers, very fragrant, especially at night.

3. *C. brevifolium.*—Native of Mauritius; leaves lanceolar, broad; bears in the hot and rainy seasons scapes with ten to twelve large white, faintly-fragrant flowers.

4. *C. longifolium.*—Native of Bengal swamps; leaves two to three feet long; scapes with eight to twelve large white fragrant flowers. A common species found in nearly every garden; blossoms during the rains. If, when the first flower of the umbel opens, the scape be cut and brought into the house and put into a glass of water, the remaining flowers will continue opening in succession for several days, scenting the rooms, particularly at night, with their most delicious odour.

5. *C. lorifolium.*—Native of Pegu; bears at the close of the rains umbels of twenty large white fragrant flowers.

6. *C. Sumatranum.*—Bears at various seasons scapes with umbels of from ten to twenty large white fragrant flowers.

7. *C. canaliculatum* (also called *C. pedunculatum*).—Leaves from three to five feet long, and three to four inches broad; scapes about two feet long, bearing umbels of twenty to thirty middling, sized, pure white long-pedicled, sweetly fragrant flowers.

8. *C. latifolium.*—Native of Bengal; leaves one to three feet long, and three to five inches broad; bears a scape one to two feet long with large pale-rose faintly fragrant flowers in the rains. A plant of immense size, with nothing corresponding to recommend it.

9. *C. Zeylanicum.*—Bears flowers almost exactly the same as the last.

10. *C. superbum.*—Native of Sumatra; root of many fleshy ramous fibres, with scarcely any appearance of a bulb. Stem short, from twelve to eighteen inches high, and as thick as a man's leg or more; scape about three or four feet long, bearing umbels of from twenty to thirty very long-pedicled, rose-coloured, delightfully fragrant flowers. Roxburgh says) :—

> "It thrives luxuriantly in the Calcutta Botanical Gardens, and is the largest and by far the most beautiful species of Crinum I have yet met with and if the fragrance of its numerous large flowers is taken into account, it is probably the most desirable of all the tribe."

11. *C. Asiaticum Toxicarium.*—Leaves from three to four feet long, and from five to seven inches broad; scape bears umbles of as many as fifty large white, nearly scentless flowers. Dr. Roxburgh says: "Its immense large beautiful, smooth, deep-green leaves make it conspicuous and desirable in the flower-garden."

12. *C. augustum.*—Roxburgh states :—

> "This magnificent plant from the Mauritius has been introduced into the Calcutta Botanical Gardens, where it blossoms at various times throughout the year, but with the greatest luxuriance during the rains; the scapes are as thick as the child's wrist, above three feet long and of a dark reddish-purple colour. The umbles bear about thirty, sweetly fragrant, rosy flowers, on pedicles from one to two inches long, and coloured like the scape."

13. *C. scabrum.*—A small plant; bears in March umbels of about five erect dingy-white flowers, bright red down the back.

14. *C. Verschaffeltianum.*—Is a magnificent plant with immense sword-like leaves, and reminding one of a huge Dracæna.

15. *C. Macowani.*—Also a plant of splendid appearance.

16. *C. Sanderianum.*—From Sierra Leone; is a distinct and beautiful new species, with white flowers having bands of crimson down the centre. Also *C. capense* from South Africa and *C. Moorei* from Natal.

HÆMANTHUS.

The several species of this genus are natives of the Cape. They all love a rich soil, and should be re-potted in February on the plains, and in March and April on the hills.

H. virescens var. Albiflos.—This is of small size and has neat ciliated leaves, its flowers resemble those of a Crinum. A most hardy plant, outliving almost any treatment. Two bulbs Firminger brought from the Cape, and had in his possession six years, only blossomed once during the time, and that was in August, after exposure to very heavy rain. No doubt it should be encouraged to become dormant in the cold months.

During recent years some beautiful varieties have been introduced, amongst which *H. Kalbreyeri* stands foremost, with its immense

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head of flowers of a bright vermilion colour. A single head produces over a hundred blooms. *H. albomaculatus* ; *Cinnabarinus* ; *hirsutus* and *Mannii* are also very attractive.

CRYTANTHUS.

A genus of very handsome Cape bulbs ; rarely, if ever, blossoming here. Firminger had seen only one species in bloom, *C. Bruckerii*, but others might be introduced with advantage. Same treatment as the preceding. The species *uniflorus, lutescens, obliquus, sanguineus*; and *Macowani*, should be tried in cool parts of the country.

EURYCLES.

E. Amboinesis.—A large bulbous plant ; native of Amboyna, not uncommon in the gardens of Calcutta. Grown in a large pot : its principal point of ornament is its large, handsome, roundish, cordate, folding leaves. Bears is May and June scapes with a head of several white middling-sized flowers. It possesses the curious property of the seeds germinating in the capsule, and even producing small bulbs there, which protrude themselves as soon as the capsule becomes sufficiently ripe to burst. In small or weakly plants the leaves die down in the cold season, and do not appear again till late the following hot season. In re-potting the bulb care should be taken not to injure the large thick fibrous roots, or it will be much retarded in its after growth. *E. Australasica* and *Cunninghamii* are later introductions of much beauty. The latter is the Brisbane Lily.

EUCHARIS.

E. Amazonica.—An exceedingly handsome plant, native of and quite naturalized in this country, with large ovate-lanceolate leaves a foot and-a-half long, of a fine deep green. Sends up in the cold months a scape, bearing five to seven large pure-white sweet-scented flowers ; propagated easily by separation of the bulbs in October. It requires abundance of water, and a rich soil.

E. candida.—An introduction from the same place, with broadly elliptic acuminate curved leaves, and an umbel bearing lovely sweet-scented flowers, of a chaste waxy whiteness. A very desirable variety. *E. Saundersii*, also an introduction from the same locality as the last. It is a somewhat distinct variety, bearing umbels of beautiful snow-white, sweet-scented flowers, having the corona marked with yellow stripes. *E. Mastersii* is a late acquisition, claiming the same native country as the two preceding. Bears a scape of deliciously fragrant flowers of the most snowy whiteness ; the free portion of the staminal cup, or corona, forms a narrow but united collar-like rim to the perianth tube. *E. Pumila* is a small-flowered variety, and a very desirable pot plant. Bears white flowers of a deliciously delicate fragrance.

All the above must be grown under glass on the hills.

PANCRATIUM.

SEA-DAFFODIL.

A genus of bulbous plants, bearing large white bell-form fugitive flowers. Require no care in cultivation. The bulbs once put down come up as a matter of course the following year, if left undisturbed.

P. Zeylanicum.—A common plant; grows in the border of most gardens; bears solitary flowers of feeble but agreeable fragrance, which generally open in the evening after heavy rain.

P. fragrans.—Differs little from the preceding.

P. maritimum.—Well known as a native of the sands on the shores of the Mediterranean; is mentioned by Dr. Voigt as blossoming here in the rains. The beautiful *P. illyricum* will succeed in the colder parts of India.

HYMENOCULLIS.

A genus of handsome West Indian bulbs, containing many species. Easy of culture. Treatment same as Eucharis *Andreana* and *amœna* are good plants.

H. speciosa.—An elegant plant, with handsome foliage of thick wide leaves; flowers borne upon short scapes in large dense heads pleasingly fragrant like those of the Petunia; blossoms in December.

H. littoralis (sometimes called *Pancratium littorale*)—the Spider Lily—is of common use as an edging for paths. In the rains it produces white flowers with six long delicate petals united at the base by a membranous corona.

ISMENE.

1. *calathina*.—PERUVIAN DAFFODIL.—A plant of no great merit Bears in May flowers similar to those of Pancratium, white, solitary, very fragrant. Like Eurycles, said to have the property of producing bulbs in the capsules. A synonym of Hymenocallis calathinum.

NARCISSUS.

The numerous species and varieties of this well-known genus thrive and blossom to perfection in the United Provinces, the Punjab, and other parts of Upper India; while on the hills many of the species are found growing in a wild state, and blooming in great profusion, especially in the valleys. But in the vicinity of Calcutta their cultivation is rarely, if ever, attended with satisfaction. Dr. Voigt states that, out of thirty-five species which had been introduced into the Serampore Garden during a period of seventeen years, only one had flowered, and continued to do so. When residing at Howrah, Firminger procured from England a large quantity of bulbs of the different sorts, and though they reached him in the seasonable month of October in sound and excellent condition, few blossomed at all, and those that did, produced but the very poorest flowers. No better success has attended the cultivation of those which have been brought down from the hills.

They require a light soil of vegetable mould and decayed cow manure loosened with sand. The bulbs should be planted three inches deep; the large ones singly and the smaller, such as Jonquils, three in a pot. They need little or no water till they have well started, and if they do not start as soon as might be expected, they must not be impatiently watered to induce them to do so, or they will be very likely to rot. Once in vigorous growth they require to be well watered continually till the leaves, changing colour, show that the bulbs are about returning to rest again. Water must then be gradually withheld, and when the leaves are dead, discontinued altogether. Catalogues of English and Continental nurserymen contain lists of some scores of varieties; and a collection once obtained should be preserved year after year. On the hills the bulbs should be started in the beginning of February.

N. Jonquilla.—JONQUIL.—This is the only species with which Firminger had any success with near Calcutta. He procured bulbs from England and they throve and blossomed well every cold season with their small pretty bright-yellow flowers.

N. Tazetta.—Has white flowers with pale-yellow cup. Dr. Voigt states that this flowered, and continued to do so in the Serampore Garden. Treatment same as for the preceding.

ALSTROMERIA.

A genus of curious and interesting plants, distinct from any of the preceding of this order in having for the most part, tuberous roots without distinct bulbs. Their leaves have the peculiarity of taking a twist just at their footstalks, and always presenting their under surface upwards. They are propagated by seed or by root division.

A. psittacina.—Has clusters of bulb-like roots, and sends up stems about fourteen inches high, which produce in March flowers with their lower part of a vivid crimson and the ends of the petals of leaf-green colour. Firminger brought down plants of this species from Ootacamund, which throve well and blossomed yearly.

CLIVIA.

S. nobilis, *C. Gardeni*, and *C. Lindenii*.—South African bulbous plants, bearing heads of beautiful tubular drooping flowers; the two first named have of late been introduced under the name of *Imantophyllum cyrtanthifolium* and *I. miniatum*, which thrive very well in our grass conservatories. Should be started in November in light rich soil. On the hills, start in February.

AGAVE.

The Agave is occasionally referred to as an Aloe, which is incorrect. All Agaves are shrubs with a rosette of succulent spiky leaves attached to a short thick stem. After a varying number of years the flowering shoot arises from the terminal bud of the stem and the whole plant dies. Propagation in nature is by root suckers, by bulbils formed on the flowering shoot, and (in some cases) by seed. Agaves are useful for hedging, and one or two isolated specimens are decorative in rocky soil. They are a common protection for railway tracks. . Country rope is made from the fibres of the leaves. The following are the common species found in India :—

(1) *Agave Wightii*—Leaves short and plant small.

(2) *Agave cantala*—Leaves long, green, with curved spines on edge, and straight spine at tip.

(3) *Agave Vera Cruz*—Leaves bluish, broad, spines as for (2).

(4) *Agave sisalana*—Leaves deep green broad, no or few edge spines, one strong terminal spine.

(5) *Agave americana*—Like (3), but with weaker leaves and greener colour. A variegated type of this is rather decorative.

FURCRÆA.

A noble genus of plants resembling Agave, the finest of which are *F. gigantea* (yielding Mauritius hemp); *F. g. variegata*; *F. bedinghausii*; *F. flavo-viridis* and *F. longæva*. Under good treatment, in an open position, some of these plants attain giant dimensions.

IRIDACEÆ.

Nearly all of this order are bulbous or rhizomatous plants; many natives of South Africa, the cultivation of which in Bengal is for the most part rarely attended with success. It is not worthwhile to mention many more than what are known to thrive and blossom satisfactorily here.

CIPURA Syn. MARICA.

Plants much resembling the Iris in regard to both flowers and leaves. The fugitiveness of their flowers is their great fault.

C. Northiana.—Bears in the hot months large delicate yellow flowers. After flowering the flower-stem bends downwards till its summit touches the ground, where it rests, and eventually throws out roots, thus forming an independent plant. When grown in a pot it is easily propagated by placing a pot by the side filled with light sandy soil, into which the flower-stalk may be bent down.

C. humilis.—A small pot-plant; bears in March pretty middling-sized flowers, with blue petals, yellow in the centre.

C. pucata.—A small plant with grass-like leaves; does well planted out in the border. Upon the sun going down during the hot months, it bursts into a profusion of blossom with surprising suddenness, and looks remarkably pretty, bearing white flowers of the size of a shilling.

IRIS.

FLEUR-DE-LIS.

Dr. Voigt enumerates as many as thirty-six species introduced into Bengal, a very small number of which probably are in existence there now. Not more than two or three are worth cultivating, as the rest seldom if ever blossom. The bulbs should be started in October on the plains, and in February on the hills. The two first named are evergreen in this country, and common in our gardens.

I. japonica.—Bears in February and March large, pale, violet-blue flowers, pencilled with yellow; a common plant in gardens in all parts of India, but seems to blossom far more freely in the United Provinces than in the locality of Bengal.

I. Nepalensis—Bears in February bright azure-blue flowers.

I. Susiana—CHALCEDONIAN or WIDOW IRIS—"Whose large flowers," Dlamer remarks, "marbled or veined with a dull greyish purple-brown suggest the idea of the hues of mourning." When at Ferozepore, Firminger procured from England rhizomes of this plant, which throve and blossomed beautifully. He obtained plants also at Howrah, but had no success with them there. Requires a light and rich soil, but much moisture is said to be injurious to it.

I. germanica.—The common German Iris of which there are many improved varieties in cultivation. Bright purple with white claw and yellow beard. Very fragrant.

I. florentina.—This is also found in considerable variety. White, often slightly tinged with violet. Beard yellow. Sweetly fragrant.

I. Persica—PERSIAN IRIS.—A small bulbous plant, bears pale blue flowers of delightful fragrance; requires a light sandy soil, and is impatient of wet. Firminger imported bulbs of this plant, but had no success with them.

I. Xiphium—SPANISH IRIS: and

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I. Xiphioides—ENGLISH IRIS.—Bulbous plants, with grass-like leaves. Of these there is a vast number of varieties cultivated in the gardens in England. They do not bear, being kept long out of the ground. Of a large assortment Firminger procured when at Ferozepore, though apparently perfectly sound, not a single one started, but remained for months, in their pots, till they eventually perished. Of a collection he imported at Howrah, all came up pretty well, and many flowered, but not at all satisfactorily.

I. Moræoides.—Thrives and blossoms well in Calcutta, bearing very beautiful white flowers in the hot season

MORÆA.

A pretty genus of bulbous plants from South Africa. Only a few species are seen in Indian gardens. Being fragrant, usually brilliant in colour, and not difficult to grow in the cooler parts of the country, it is a pity that good species are not more extensively grown. The following are the best :—*M. iridoides ; M. spathacea ; M. edulis; M. angriculata.*

TIGRIDIA.

T. Pavonia—TIGER-FLOWER.—A large bulbous plant ; bears great gorgeous but most fugitive flowers, with bright scarlet petals. and the centre spotted like a leopard's skin. It blossoms here in July and August. It thrives well in Upper India and Ootacamund, where it is met with in abundance. The bulbs should be started in March and April, both on the hills and on the plains.

PARDANTHUS.

P. Chinensis—LEOPARD-FLOWER.—An herbaceous plant with Iris-like leaves; bears during the rains an upright stalk two feet high, and upon its summit several middling-sized dull orange-coloured flowers with scarlet spots ; a common plant in all gardens in India.

GLADIOLUS.

SWORD-FLAG.

A genus of bulbous plants bearing brilliant lovely flowers of varied hues ; the number of hybrids and varieties that have been raised by cultivators in Europe is almost endless. It is one of the few South African bulbs of the order which thrive to satisfaction in this country ; and a selection of good varieties once procured may be preserved with little difficulty from year to year. They may be planted either in pots or in the open ground towards the end of

October on the plains, and in March on the hills, where they come to great perfection. They require a soil, principally of sandy leaf-mould. They should be planted as much as six inches deep, otherwise the new corm which forms above the old one is apt to push above ground. It is recommended to put a layer of sand an inch thick over the corm when planted. They blossom in March on the plains, and from July to September on the hills. After flowering the leaves gradually die down, and then the pots with the dormant corms should be put in some place where they may remain dry till the time comes round to pot them afresh. There are two divisions, *Gandavensis* and *Brenchleyensis*, the latter being mostly vivid scarlet, but differing little from each other in general appearance. The species *G. Childsi* and *G. præcox* are very desirable, and all seedsmen offer excellent hybrids. Mr. Charles Gray, of Coonoor, elevation 6,000 feet, gave the following directions :—"In planting the corms care should be taken to dig the ground deep, and the corms should be planted at least nine inches deep in good soil ; do not use horse dung, as this sometimes ferments and rots the corms. Gladioli are best planted in clumps. I put out 7,000 one year, and as the flower-spikes came up on an average of ten from each corm, I had about 21,000 at once and a finer sight one could not have ; these plants are easily raised from seed. I started with four corms, and in three years had the above number. I may mention that of the 7,000 raised from seed, not two flower-spikes alike could be found. When the flowers are over, and the seed collected, if you wish, the stalks should be cut down to about one foot from the ground and left for two to three weeks before lifting. The right time to cut these stalks is just as the leaves are turning yellow.

"Having dug out the corms, they should be put away side by side, not thrown on one another in a box or cupboard, and left there until they commence to shoot. It is most important that the corms are not planted till the shoot appears, for if you force the shoot by early planting, poor flowers and spikes will generally be the result ; the poor flowering affects the size and colour of the flowers, hence people say 'My Gladioli are not what they were last year, not nearly so fine, and they changed colours.' This is entirely due to forcing them."

SPARAXIS.

A genus of South African bulbous plants of small size, bearing abundant flowers of great beauty. Some four or five are mentioned by Dr. Voigt as succeeding in this country and blossoming in February and March. The cultivation of them is much the same as that of the Gladiolus. The following are given as the finest:—

S. lineata.—Flowers white with pale-green eye, clouded with black. *S. grandiflora*.—Flowers purple with white rim; of extraordinary beauty. *S. tricolor*.—Flowers very large ; orange and yellow. English seedsmen's catalogues contain lists of many varieties and a collection once imported can be kept up and increased every year.

This genus is particularly well adapted for cultivation at hill stations in the south of India. The numerous varieties offered by seedsmen include nearly all colours.

IXIA.

South African bulbous plants, between which and the last-named genus there is but a slight botanical difference. The cultivation is the same. Some succeed and flower well in this country. Those considered finest are :—*I. Helleni*. *I. flexuosa*.—Flowers white, rosy-striped. *I. viridiflora*.—Flowers green, star-formed, with purple eye. *I. Trichonema rosea*. There are many more beautiful varieties mentioned in the catalogues of English seedsmen.

CROCUS.

The cultivation of the English Crocus has not been attended with success in this country on the plains ; but on the hills they succeed admirably. Put down the bulbs in February on the hills, and in October on the plains.

C. sativus—SAFFRON—*Záfràn*.—Of this very beautiful species Firminger obtained bulbs from a friend brought from Kashmir, which blossomed to perfection in his garden at Ferozepore. The plant thrives well in Baluchistan and provinces with similar climate.

HÆMODORACEÆ.

SANSEVIERA.

BOWSTRING HEMP.

An African genus (excepting two species said to be indigenous) of hardy perennial plants, noted both for their quaint habit of growth and the valuable fibre they afford. The cartilaginous sword-like leaves are densely produced from a creeping stoloniferous stock, which develops rapidly in a loose sandy soil. All the species delight in a little shade and spread in dense patches during the rainy season. The flowers, which appear in the dry season, are creamy to greenish-white, and sweetly scented ; but they are of secondary value to the variegated leaf. Easily propagated from offsets.

S. zeylanica.—Indigenous. Flower lemon-white, leaf 20—30 inches, sword-shaped, almost cylindrical, deeply channelled, pale green with whitish markings, margin red-lined and scarious. A good rockery plant. There are several varieties in cultivation.

S. cylindrica.—A very distinct plant of a dark, sombre colour, Leaf 3—4 feet, cylindrical throughout, rigid and coriaceous. Curious, but not ornamental.

S. longiflora.—Flower raceme, 1—2 feet long, greenish-white. Leaf, 20—30 inches, oblanceolate, 3—4 inches broad, white-spotted and red-margined.

S. guineensis.—This, of which there are several varieties in cultivation, is the most ornamental plant of the genus. Leaf oblanceolate, flat, copiously spotted and banded with silvery-white on a dark-green base. 3—4 feet long by 5—6 inches wide.

SCITAMINEÆ.

HELICONIA.

A genus of handsome-leaved plants, natives of tropical America, and forming fine bushes or clumps. They have something of the appearance of the Plantain, with their cool, refreshing leaves. They are very easy of culture, but require a somewhat rich soil, with plenty of moisture, to bring them to perfection. Propagated easily by division during the rains. The following are among the most ornamental species :—

H. Buccinata.—Native of Amboyna, with rigid, erect-growing leaves, and protuberant ribs ; a very ornamental plant, and an old favourite.

H. aureo-striata.—From the South Sea Islands, one of the best, the leaves being striped horizontally with streaks of gold.

H. metallica, with leaves of bronze colour, and having a beautiful metallic appearance.

H. stricta-rosea, an erect-growing plant, with leaves of a beautiful green, and with a decided rosy tint.

H. triumphans, a recently introduced plant of noble aspect, with bright green leaves striped with greenish black, and of very much the aspect of Maranta Zebrina ; native of Sumatra.

H. Urendi, an old favourite and a handsome ornament of the plant-house.

H rubra-striata.—A noble plant 6—8 feet, striated green and red, the latter colour prevailing in beautiful rosy tints during young growth. Requires shade with plenty of water.

STRELITZIA.

A genus of plants, natives of the Cape, held in the highest estimation in Europe for what are considered their gorgeous flowers. Cultivation same as for Heliconia.

S. augusta.—The white-flowered Bird-of-Paradise flower.

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S. Reginæ.—Accounted a magnificent plant in Europe. Its sepals resemble so many orange-coloured splints of different forms, bundled together with two arrow-headed deep purple petals, and project from a narrow spathe six inches long. Most readily raised by seed, obtained through impregnating the stigma when the plant is in flower.

URANIA.

U. speciosa, syn. Ravenala Madagascariensis TRAVELLER'S TREE.—The following is a condensed description of this plant as given by Mr. Ellis :—

"The tree rises from the ground with a thick succulent stem, from the centre of which it sends out long broad leaves, like those of the Plantain, only less fragile and rising not round the stalk, but in two lines on opposite sides. The tree presents the appearance of a large open fan Many of the trees are at least thirty feet from the ground to the lowest leaves. I frequently counted from twenty to twenty-four leaves on a single tree, the stalk of each leaf being six or eight feet long, and the broad leaf itself four or six feet more.

"This tree has been most celebrated for containing, even during the most arid season, a large quantity of pure fresh water in the thick firm ends of the stalks of the leaves, supplying to the traveller the place of wells in the desert."* The nature of this water is often such as to render it undrinkable. The plant produces one or more flowering shoots in the axils of its leaves and these develop fruits containing squarish, black seeds with a brilliant blue aril.

It is a common plant in gardens about Calcutta. Easily propagated by division.

MUSA.

The decorative value of this genus (Bananas and Plantains) is of quite a secondary consideration in this country. But in Europe such species as *M. ensete* (the Abyssinian Banana), and *M. superba* (the indigenous Hill Plantain), are held in esteem as decorative plants. A full-grown plant of *M. superba*, with its bulb-like stem, pretty colouring, and faultless leafage, is indeed a grand sight. Protection from wind is a very necessary precaution. The variegated species, *Vittata Sumatrana* are not uncommon in our plant houses. *M. textilis*, the Manila Hemp Plantain, is also cultivated. Certain species produce suckers, others only seeds. Propagation by suckers is preferable, where these are produced. *M. superba* produces no suckers.

GLOBBA.

Few of the species of this genus are of much importance from a decorative point of view. Cultivated in the same way as the common Ginger.

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* Madagascar p. 302.

GSL

G. subulata.—Native of Chittagong,—

"Blossoms," Roxburgh says, "during the hot season, with a constant succession of flowers from the extremities of the lengthening branches of the panicles for nearly two months, which renders this lovely plant one of the most charming of the whole order I have yet met with. Flowers small, beautifully purple, with the lip deep orange-yellow."

G. spathulata.—Native of Sylhet; described by Roxburgh as a beautiful species, with large azure-coloured radical inflorescence; blossoms in April, when the foliage appears. At the beginning of the cold season it perishes down to the root.

CURCUMA.

TURMERIC.

A numerous genus of plants with Ginger-like roots, sending up naked from the ground, about nine or ten inches high, thick spikes of flowers, the principal beauty of which consists in the large, gorgeous coloured bracts. There is a great sameness between many of the species. The following are perhaps those most deserving of cultivation :—

C. Zerumbet—LONG ZEDOARY.—Bears in April, before the leaves make their appearance, flower-spikes with the terminal tufts of barren bracts, contrasting prettily with the pale-yellow and green of the lower fertile ones. Leaves large, lanceolate, and handsome; fragrant when bruised.

C. Roscœana.—Native of Pegu, and common in Calcutta. Sir J. Paxton's description of this plant is:—

"Floral envelopes gorgeous scarlet ; blossoms yellow; continues in flower more than two months without beginning to fade. Plants kept in dull situations flower feebly, and are pale and dingy. It requires strong solar light to elicit the scarlet colour of its blossoms. A plant of dwarf habit and noble foliage."

C comosa.—Native of Burma. Roxburgh says of this species:—

"By far the most beautiful and the largest of the genus I have seen ; bears in May, before the appearance of the leaves, short-scaped, large, clavate spikes, with the fertile bracts of a beautiful pale pink, and the barren ones of a lovely rosy red."

C. Zedoaria—WILD TURMERIC—RED ZEDOARY.—Native of Bengal, common in gardens about Calcutta. Scape rises before the leaves in the hot season as thick as a man's forefinger, bearing beautiful large, rosy tufted spikes. Roxburgh says :—

"This plant, when in flower, is highly ornamental, few surpassing it in beauty ; at the same time it possesses a considerable degree of delicate aromatic fragrance.

C. Neilgherrensis is abundant on the Western Ghauts, where the pretty bracts and flowers are familiar objects in woods during the dry season, or shortly after spring showers.

KÆMPFERIA.

A genus containing several species of tuberous-rooted plants, the pretty delicate flowers of which are produced so close to the ground that unless the plants are grown in pots they are lost to sight. Their leaves die down in the cold weather, when the roots may be separated and re-potted in a light good soil. The two following, which are very common, are met with generally in the gardens in India.

K. rotunda—Bhooin-chumpa.—A plant with large oval-lanceolate leaves, which die down towards the end of November, and do not appear again till after the plant has finished flowering in April. Flowers, with two petals white and two deep lilac, of moderate size, borne not more than two or three inches from the ground, in a crowded manner, opening day by day in succession in the morning and fading by the evening, and diffusing a most exquisite fragrance.

K. Galanga.—Has roundish leaves of a beautiful refreshing green, overlapping each other, and lying flat upon the ground, and forming a delightful relief to the delicate flowers, which seem just to rest upon them. The flowers, of a pearly white with two purple spots, are borne throughout the rains, and are quite scentless; but the root, as well as the leaves, when bruised have a fine fragrance.

K. Kirkii, syn. *Cienkowskia.*—A pretty herb from Zanzibar. It bears exceedingly nice flowers of a soft purplish rose colour, with a golden spot in the centre borne in a many-flowered scape. Suitable for the conservatory, where it grows well in a light rich soil, containing plenty of leaf mould.

Some of the newer varieties are *K. Bensonæ*; *Gilbertii*; *Moulmeinensis* a really handsome plant, *rosceana* and *undulata*.

ELETTARIA.

E. Cardamomum—THE CARDAMUM—Although an effective foliage plant this is occasionally grown in gardens more for curiosity than ornament. It requires rather dense shade, with plenty of water and a rich soil with plenty of humus.

AMOMUM.

A. angustifolium.—Similar in habit to Elettaria, but having narrower leaves of great length. The flowers, which are borne on short pendant spikes, are variable in colour ranging from chrome-yellow to crimson. An interesting plant from Madagascar. Requires shade with plenty of moisture. Propagated from seed and offsets.

A West African species, named *A. Granum Paradisi*, gives rise to the appellation "Grains of Paradise."

HEDYCHIUM.

As many as twenty-four species of this genus, all natives of Nepal and the Khâssya Hills, are enumerated as growing in Bengal. They all have Ginger-like roots. Their stems, with their sheathing lanceolate leaves, die down partially in the cold weather, which is the proper time for separating the roots and planting them out in a well-manured soil. They are too large to be grown satisfactorily in pots.

H. coronarium—GARLAND-FLOWER.—This is a very common plant, accounted the finest of all the species, and certainly one of the loveliest ornaments of the garden. The numerous stems, about three feet high, rise in succession during the rains, bearing on their summit dense bracteal heads of large pure white flowers, which emit a delightful fragrance, particularly in the evening for a long distance around. Bears seed abundantly in the cold season

There is a variety with yellow flowers

H. chrysoleucum.—Bears flowers nearly of the same size as those of the last, described by Curtis as "very handsome, deliciously scented, of a pure white, bright orange in the disk, and the anthers and filaments a very deep orange."

H. flavum.—Roxburgh calls this a charming species, and says :—

"It differs from H. coronarium in regard to its flowers, which are about one-third smaller, and partake not only of the yellow colour of those of Michelia Champaca, but possess even their peculiar fragrance, only in a less powerful, and therefore more grateful, degree. In stature and leaves both species are alike A native of Sylhet, and blossoms in the rains.

H. angustifolium.—Has very narrow leaves, and stems about three feet high ; bears during the rains spikes of small, narrow-petalled, pale dirty-red, scentless flowers of little beauty.

ALPINIA.

A genus of plants with large lanceolate leaves, some bearing very beautiful flowers. They soon overspread a large extent of ground, and on that account, are apt to be rather troublesome in a garden. They can be multiplied to any extent by division of their rhizomatous or Ginger-like roots.

A. nutans.—Bears drooping compound racemes, about a foot long, of very beautiful flowers, somewhat of the size and form of the Foxglove, with bracts and calyces of a pure pearly white, the edges of the flower tinged with pink, and the interior orange. In blossom most of the year. Thrives best in swampy ground. Grows to

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six feet high or more, and so soon extends over a large portion of ground, that it is unadapted for a small garden.

A. punicea.—Native of Sumatra; a stately species; bears large flowers, of colour of the finest carmine, in the hot months.

A. Malaccensis.—Native of Chittagong. Roxburgh's description of this species is :—

"That the leaves are lanceolate, about two or three feet long; flowers very large, pure smooth shining white, except the inner border or labium, which is a beautiful mixture of orange and crimson. The most beautiful of the whole genus, even surpassing A. nutans."

A. Allughas.—A common plant, Roxburgh says, near Calcutta in low moist places among brushwood. Leaves lanceolate, polished. Flowers, beginning of the rainy season, large, numerous in succession, of a beautiful rose colour, inodorous.

A. Mutica.—Roxburgh described this as bearing :—

"Large numerous drooping flowers at the beginning of the rains. Calyx longer than the corolla, pure white. Corolla-lip or inner border large, elegantly variegated with crimson and yellow, surrounded with an orange-coloured edging."

A. calcarata.—An interesting plant, about three feet high; bears in the hot season rather large flowers, buff colour, striped with purple. The whole plant, though aromatic, has a strong smell of tallow.

A. albolineata and *A. Vittata* are recent introductions, and have striped and variegated leaves of a very ornamental character.

COSTUS.

C. speciosus.—Native of Bengal; a common plant, often met with growing wild in swampy places. When in blossom during the rains a most beautiful object. The dark rich green of the large lanceolate leaves, the deep crimson of the bracteal heads, which are as large as a man's closed hand, and the white to pale lavender flowers, full five inches across, form together a most delightful combination of colour. Cultivated in the same way as the common Ginger and also an excellent plant for the neighbourhood of a tank or pool.

C. argyrophyllus.—Bears during the rains large white flowers but is of little merit as a garden plant.

C. Amazonica and *C. elegans* are both ornamental plants, and well worthy of a place in a collection.

MARANTA.

An extensive genus of tropical plants, most of them remarkable for the highly ornamental character of their leaves. They are very easy of culture, and thrive to perfection in our grass conservatories, where they form quite a striking feature. The soil recommended for Ferns suits them admirably. They love moisture and shade, and are at their best during the rains. The leaves die down generally in the winter. About the end of March on the hills, and February on the plains, the tuberous roots should be taken out of the pots, and separated and planted out in separate pots, thus securing an additional number of plants. They must be grown as stove plants on the hills. *Maranta arundinacea* gives the arrowroot of commerce.

There are over fifty varieties in cultivation, all more or less ornamental-leaved. The following are among the best :—*M. albolineata ; Asymmetrica ; Bachemiana ; bella; bicolor; Binotii; exima ; fasciata ; Hardingi ; illustris; Kerchovanai; Lindeni; Lowei; Lubersii ; iconifera ; nigro-costata ; ornata; pinnata-picta; Porteana; Prasina; Princeps; Pulchella; Regalis; roseo-picta; sanguinea; Veitchii; Virginalis; Wallisii; Wictii* and *zebrina*. The foregoing will form as choice a collection as can be wished for. The following which are also very ornamental, can be added if desired :—*M. albovittata; amabilis; bicolor; Chimboracensis cineria; Goveana; Legrelliana; Leopardina; Leitzei; Makoyana; Massangiana; nitens; Oppenheimiana; Porphyrocaulis; rubra; Seemanii; setosa; splendida; tubispatha; undulata; Vanden Heckii* and *Warscewiczii*.

PHRYNIUM.

P. dichotomum.—Native of Bengal, closely allied to, and resembling, Calathea : a shrub four or five feet high ; bears in the hot season very pretty and delicate white flowers of moderate size by twos on a stem, but not in sufficient number to relieve the dense mass of foliage. *P. villosatum* is also met with at Calcutta. Cultivation same as for Maranta. *P. variegatum* is a strikingly fine-foliaged plant introduced from Singapore.

CALATHEA.

A genus so closely allied to Maranta that the several species of each are often confounded. It contains many beautiful-leaved plants, which succeed admirably in this country. In the Jardin des Plantes at Paris, Firminger noticed the following as especially beautiful:—*C. picturata ; C. micans ; C. ornata picta ; C. eximia* and *C. pulchella*.

C. zebrina—ZEBRA PLANT.—Native of Brazil ; has been described as "one of the handsomest stove-plants in existence in respect to its foliage, which is large, velvety, and beautifully variegated, with dark green and a paler tint." * Plants are to be met with in some of the gardens about Calcutta, but they certainly do not realize so favourable a description, the green upper surface of the leaf being of a dead hue, and the stripes, though distinct, not sharp and vivid. The lower surface of the leaf, which curls over partially from the base a short way upwards, is of a dull purple. It bears clumps of pale purple flowers, situated close upon the ground, about the beginning of the hot season.

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* "Glenny's Handbook to the Flower Garden," p. 61.

C. bicolor and *C. Warscewiczii* are met with in Calcutta *C. erecta* is very similar in appearance to Maranta Lindeni. Cultivation of all similar to that for Maranta.

CANNA.

INDIAN SHOT.

Ukul-bhar.

A very numerous genus of handsome-leaved plants, bearing brilliant flowers varying from pale yellow to deep crimson. Between the several species there is so great a similarity of character as to make it needless to retain in the garden more than some two or three of the best. They all have large lanceolate leaves, grow from three to six feet high, and apt to become exceedingly troublesome by throwing up suckers for a great distance around. Most easily propagated either by division of roots or by seed. They all love a rich soil and plenty of moisture. The soil should have a large proportion of sand. The Cannas are gross feeders and liquid manure should be freely given. They do not flourish in exposed places. They are admirable as plants in the wet soil round tanks and pools, in well-watered beds under light shade, or in pots in sheltered situations.

C. Annæi.—Bears a robust stem more than six feet high, with numerous heads of large flowers, salmon rosy-yellow, or orange-red; *C. gigantea*, with red flowers, and *C. zebrina* are most worthy of cultivation. The following species, according to Firminger, were in cultivation in this country :—

C. Indica.—The well-known species, native of India, and found almost everywhere, constantly in blossom, with its small but vivid yellow and red flowers.

Var *lutea.*—A variety with yellow flowers.

C. Roscœana.—Has orange-coloured flowers, spotted and striped with crimson.

C. edulis.—Has small purplish flowers, with the lower lip striped.

C. Achiras.—Has also crimson-scarlet flowers.

C. Schuberttii.—Has crimson-scarlet flowers, somewhat larger than any of the preceding.

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C. glauca.—Has narrow glaucous-green leaves, and bears rather large, pale, lemon-yellow flowers.

C. Warscewiczii.—This is beyond comparison the most beautiful of any of the species met with in India; bears brilliant crimson flowers, admirably set off by the stems, which are of a rich chocolate brown, as well as by the leaves, which are striped and edged with the same colour.

C. discolor.—Has large crimson flowers, with the leaves and stems somewhat similar to the last, but not so handsome.

C. flaccida.—This is a most beautiful plant, totally distinct from all the other species in the size and form of its flowers which are of a bright yellow, and as large as those of an Iris.

The number of Canna varieties offered for sale by seedsmen is now very large. These varieties have been produced by selection and crossing of the above and other species. Crozy's Hybrids (so called after their French producer) are a famous group of these creations. The Orchid-Flowered is another famous strain with many types. It would be invidious and difficult to single out special trade varieties, the descriptions of which may be found in all modern catalogues.

ORCHIDACEÆ.

ORCHIDS.

This is a genus of plants of such varied form, colour, and growth and so widely distributed over the face of the earth, that it is no easy task to lay down hard-and-fast rules for their cultivation. They have, however, risen in popular favour to such an extent, and are held in such esteem for their lovely and fragrant flowers, which are remarkable no less for beauty and brilliancy and gorgeousness, than for their extraordinary form and shape, that it becomes an imperative duty to deal with the genus in some detail in a work such as this. More especially is this necessary now that orchids are more generally cultivated in this country. It will, however, be obvious that it would occupy fully one hundred pages were an attempt made here to deal with the subject exhaustively and enumerate every species in cultivation. Such a task requires a work exclusively devoted to orchids. It may, however, be stated here that, so far as it has been found practicable, nothing has been omitted which is at all essential for the purposes of successful cultivation of these remarkable plants.

Distribution of Species.—The natural home of the orchid is the tropical zone; some of the loveliest species come from the Khâssya Hills, Nepal, Sikkim, Bhutan, Assam, Burma, and Ceylon. In Lower Bengal many beautiful species are found growing in a wild state. In Darjeeling, the Terai, and on the lower ranges of the Eastern Himalayas, they also abound. In Java, Sumatra, Borneo, and the Straits Settlements generally, they are also found in great numbers;

while in South Africa they also form a striking feature of the vegetation of that region. But by far the greatest number of species, and of the most beautiful types, come to us from tropical South America, Mexico, and the West Indies.

Natural Conditions.—In their natural state Orchids are found growing out of crevices of rocks, upon moss-grown situations, and upon the branches and trunks of trees ; but as a rule in situations where humidity and shade abound. One or two of the species are partial to bright sunshine, without which they cannot be brought to thrive at all. But if there is one thing more than another which is fatal to their growth, it is *stagnant moisture*, from which they are singularly free in their natural habitats.

Division of Species.—Orchids are divided into two great divisions, viz., terrestrial and epiphytic. Terrestrial Orchids are those which grow more or less in soil, and have their roots embedded in it from which they absorb the nourishment necessary for their growth. Epiphytic Orchids comprise those which grow upon the branches of trees, having their roots exposed to the air, from which they imbibe all the nourishment requisite for their growth. This distinction between the two species must always be carefully considered in apportioning the treatment necessary for them. There is a notion prevalent that every Orchid—because it is an Orchid—must of necessity be tied on to a piece of wood. The result of such indiscriminate treatment is, in nine cases out of ten, failure. Other amateurs, again, religiously pot off everything in the shape of an Orchid in soil that would not even grow a Potato. Therefore, when an Orchid has been obtained, the first point to ascertain is, whether it is a terrestrial or an epiphytic Orchid. This can easily be done. The former have fibrous roots, more or less ; and the latter long, thick, fleshy roots, as a rule ; the exceptions are few. Having determined this point, proceed next to consider their—

Cultivation.—In order to cultivate Orchids successfully, the first point of importance to bear in mind is to reproduce artificially, as nearly as possible, the natural conditions under which they are found growing, and the preceding remarks indicate briefly what these are in a general sense. It must not be forgotten that, although they love moisture, heat and shade, yet free ventilation, absolute cleanliness and thorough drainage are more essential to successful cultivation than anything else. These three points are emphasized here, as they are more often neglected than not, with very disheartening results. In the matter of shade, it is well to remember that it is not meant that the rays of the sun should be altogether excluded. What is necessary is that there should be an equal division of sunlight and shade, such as is afforded by a tree, and which is reproduced admirably in a grass conservatory, if properly constructed.

Terrestrial Orchids should, as a rule, be cultivated in pots, pans and hanging baskets, filled with a soil composed somewhat as

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follows :—Take charcoal varying in size from a Pea to a Walnut; broken brick of the same size, or old mortar ; mix these with coarse leaf-mould well decayed, and fill up a pot with the compost. See that large pieces of old mortar and charcoal are placed at the bottom, with a layer of moss or cocoanut fibre, for drainage. Into this plant the Orchid.

Epiphytic Orchids should always be grown attached to a log of wood, or square slabs of teakwood, to which they should be securely fastened by means of copper wire and tacks, taking care to spread the roots evenly over the log or slab, so as not to injure them. In the case of Orchids having very fleshy roots, no covering of moss or cocoanut fibre is necessary. It is only in the case of those having thin, stringy roots that this is at all necessary. The plants readily attach themselves to their supports, and go on thriving and forming new roots, so long as the atmosphere is kept moist, and they are not allowed to suffer from dryness.

Some of the modes of growing both kinds are given in Figs. 31, 32, 33, 34 and 35. But these may be varied to suit individual tastes, especially in the shape and design of the hanging baskets. When pots are used, they should invariably have perforated sides by which thorough drainage is secured. The only objection to the latter is that it admits of insects getting at the roots. To avoid this, it is usual to place an inverted pot in water, and on top of this the pot containing the plant. By this means not only are insects kept out, but continued moisture is secured, especially at the hottest and driest time of the year, when Orchids are in the condition of most vigorous growth. During the rainy season, however, the placing of them in

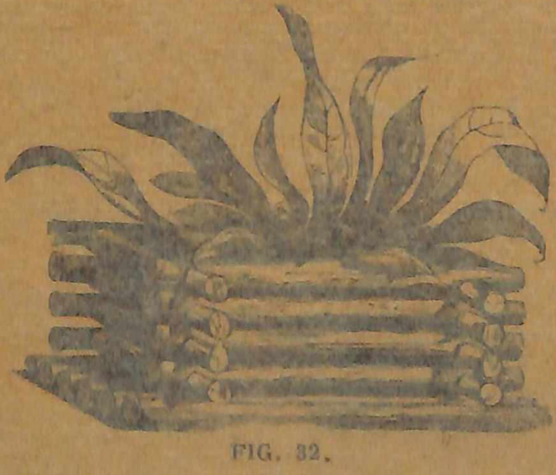

FIG. 32.

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water is not necessary ; indeed, the problem the gardener has to solve at this time is how best to keep his plants from getting too much moisture, and secure thorough drainage. In the case of such as are grown on logs, slabs, and in hanging baskets, this difficulty does not present itself. For potted plants the best plan is to keep them on the stands, either wooden or masonry, which are usually constructed in plant-houses. Placing them on the floor should be rigidly avoided during the rains, especially in Lower Bengal, and in places where the rainfall is heavy and the atmosphere very much saturated with moisture.

Orchids, like most other plants, require a certain period of rest, when they cease to make any growth. During this time they require little or no water, or only sufficient to keep them alive. It is after they have had this rest, that they are ready to blossom to the best advantage. This period is almost the same here as in England, viz., from November to February. It is usual, about the end of February, to do all the re-potting and general fixing up of the plants, for they begin to put forth their blooms about the first week in March. Some of them do so earlier, and in the latter case, a sharp watch must be kept on the plants for any signs of growth. As soon as the re-potting and replenishing has been done, the plants should be watered, sparingly for the first few days, and as soon as they begin to show signs of vigorous growth, copiously. Syringing frequently during the day is a good plan. If a garden engine or hand-pump is available, so much the better, as they are invaluable in the Orchid and plant-house. If these directions are carefully attended to, and other surrounding conditions being favourable, a beautiful display of flowers of most gorgeous and varied hues may be expected, lasting for fully two months, March and April. Nothing can surpass in loveliness and variety a collection of Orchids in full bloom.

Propagation.—This is, perhaps, the most difficult operation in the cultivation of Orchids, and no hard-and-fast rules can be laid down which could be successfully applied to every species, differing as they do so widely in point of habit and growth. It may, however, be stated that as a general rule, most Orchids can be increased by division, either of the roots or the pseudo-bulbs (swollen stems). The following directions for propagating Orchids, given by Mr. B. S. Williams in his work, "The Orchid Grower's Manual," will be found very useful, being equally applicable here as elsewhere :—

"I. Some are easily increased by dividing them into pieces or by cutting the old pseudo-bulbs from the plants after the later have done flowering. Such plants as Dendrobiums are increased in this way. The best time for this is just as they begin to grow, or when they are at rest. They should be cut through with a sharp knife between the pseudo-bulbs, being careful not to harm the roots. Each piece should have some roots attached to it. They should be parted and potted, and receive no water till they have begun to grow.

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"II. Dendrobium Nobile, D. Pierardii, etc., are propagated (*a*) by bending the old pseudo-bulb round the basket or pot in which they are growing; (*b*) by cutting old flowering bulbs away from the plant, laying them on damp moss, and when they make roots, potting.

"III. Dendrobium aggregatum, D. densiflorum, and similar species are increased by dividing the roots.

"IV. Aerides, Vanda, Angrœcum, Saccolabium, Renanthera, (*a*) by cutting off the top of the plant, just below the first root, and (*b*) by taking young growth from the bottom of the plant.

"V. Epidendrum, Cymbidium, Cattleya, Cœlogyne, Bletia, and many others, by dividing into pieces with portions of the roots attached, and a young bulb on the pseudo-bulb."

The foregoing directions are certainly limited, but they illustrate the general principles of propagating Orchids. Much will depend upon the growth of individual species, and it is only by experience that the gardener will be able to arrive at the best, quickest, and safest method of increasing any particular variety. Thus, in the case of Orchids of purely epiphytic growth, such, for example, as Phalænopsis, which throw up separate growths, which are in themselves fully developed plants, it will only be necessary to sever these (and this is easily done) by cutting through with a sharp knife, taking care not to injure the roots, and attach them to logs and slabs to secure fresh plants. Opportunity has been taken to give general directions only here; but the methods of propagation applicable to each genus will generally be found under each particular head.

The best season for propagation is certainly just before the plants begin to grow, *i.e.*, in February. Many of the species are, however, best increased during the rainy season; and there are some gardeners who prefer this time of the year, as there is less chance of the plants dying off for want of moisture.

The Orchid House.—It is always more satisfactory to grow Orchids in a house exclusively devoted to them, as they can then be attended to with greater facility. A structure such as that described at page 37 will be found best adapted for these plants. The water in the centre is most essential during the hot, dry months of summer. During the rainy season it is essential to keep this tank dry. If it slopes in one direction, and has a suitable outlet, there will be no difficulty about this.

In those cases where it is found impossible to have a separate house, the common grass conservatory devoted to other plants will answer just as well, provided there is a reservoir of water in the centre. If a pressure of water can be obtained, one or two fountains, or a finely perforated zinc or lead pipe running along the upper part of the walls of the house, would prove an admirable arrangement for cooling and moistening the atmosphere of a plant-house, by allowing water to run along these pipes and fall in a spray. This would, however, only be necessary during the months of April, May, and June.

Orchids may also be grown in glass houses on the plains; but these structures must be cool, well ventilated, and have a shade of some sort on the roof, to subdue the fierce heat and light of the sun. During the cold months a glazed house is found very useful; for the plants having finished their growth, may be then placed here and be so protected from severe cold, such as they would be subjected to in the Upper Provinces, until their period of growth came round again.

Cultivation on the Hills.—For the information of those who devoted some of their leisure to cultivating these beautiful plants on the hills, it may be stated that their treatment is almost in every particular the same as that adopted in England. And as there are so many handbooks extant on the subject, it is not considered necessary to give any detailed directions here. Suffice it to say that Orchids on the hills must be grown in hot-houses. The methods of propagation given for the plains apply equally to the hills; while the directions as to soil, potting rest, and the various methods of growing them, are also similar.

The plants enumerated and described below do not by any means comprise all the species in cultivation. To do this would be a task much beyond that which was contemplated in a work such as this. Every day new species and varieties are being added, while collectors in all parts of the world are continually sending immense consignments of Orchids, amongst which many new, rare, and hitherto unknown species are always found. It will, therefore, be obvious that any attempt at a comprehensive description would be quite impossible. But it may be stated that the most important, well-known types, and those most commonly met with in Indian gardens, will be found fully described.

DENDROBIUM.

A genus said to contain nearly four hundred species, very many of which are natives of the Assam Hills. They are found for the most part to thrive well in the locality of Calcutta. Several blossom with drooping festoons of flowers; these it is best to grow in suspended pots or baskets. With some it answers merely to attach them to the limb of a tree, binding them on with a little moss or cocoanut fibre.

D. Aggregatum.—Flowers large, deep-orange, in large compact clusters; a lovely plant, not at all uncommon in Calcutta, where it thrives well. Also *D. aggregatum majus.* A large flowered variety.

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D. Andersonii.—Leaves smooth and bright green ; blossoms in June, with beautiful pure white, strongly aromatic flowers.

D. angulatum.—Native of the Andamans ; bears pretty pure white flowers of a delicious honey-scent, which lasts only eight hours.

D. Calceolaria.—A large straggling plant with rod-like striated stems, three to six feet long. Flowers bright yellow with two purplish brown spots on the lip.

D. Cambridgeanum.—Stems thick and nodose ; flowers bright yellow with brown spots.

D. Chrysanthemum.—Native of Assam ; a remarkably handsome plant, with its rich thick glossy leaves, which set off admirably its fine large trusses of orange-coloured flowers.

D. Dalhousianum.—Stems stout, smooth and plump, marked with purple lines. Flowers in racemes, four inches across ; creamy-yellow tinged with rose ; lip yellow at the base, marked with a pair of large crimson spots.

D. densiflorum.—Native of Sikkim. Pseudo-bulbs, club-shaped ; terminal leaves fleshy. Flowers in dense drooping panicle, yellow with orange lip.

D. Devonianum.—Native of Khâssya ; a slender plant. Flowers of great delicacy and beauty, having a large frilled white lip, tipped with crimson, and with two kidney-formed orange spots in the centre.

D. Falconeri.—Native of Sikkim. Stems branched, very narrow ; strongly knotted, four feet long. Flowers white, tipped with purple, lip white with rich purple blotch at the base, and golden margin. One of the finest.

D. Farmeri.—In habit somewhat like densiflorum. Flowers looser, variable, pink and yellow. Also *D. Farmeri album*, with white flowers.

D. fimbriatum.—Native of Assam ; a splendid plant, producing large handsome trusses of bloom well relieved by the rich foliage. Flowers apricot-yellow, two inches across. Var. *oculatum* with a kidney-formed blood-coloured spot on the base of the lip.

D. formosum.—Flowers white with deep yellow stain on lip Var. *giganteum* from Burma.

D. Jenkinsii.—Native of Goâlpâra ; a pretty, compact little Orchid, with strap-like leaves, two or thre inches long ; bears a pretty cluster of Apricot-coloured flowers.

D. macranthum syn. *macrophyllum.*—Native of the Philippines. Flowers six inches in diameter, rosy-pink ; with lip deep claret stain ; scent unpleasant. The finest and largest of all.

D. nobile.—Native of N. India. A lovely plant when in full blossom. Flowers two inches across, white, deeply-tinged with violet, with two club-formed deep purple spots on the base of the lip.

There are *Wallichii, Lindleyanum,* and other varieties differing in colour.

D. Parishii.—Semi-pendulous with thickish bulbs. Flower numerous, beautiful rosy-purple.

D. Pierardii.—Flower large, French-white, borne in drooping festoons of blossom several feet long. A most beautiful Orchid, very common about Calcutta, where it thrives well on the bough of a tree. There is a variety, *latifolium*, of double the size.

D. secundum.—Native of Borneo. Stems short and thick ; with spikes of deep rose-coloured flowers.

Others met with about Calcutta are : *D. albo-sanguineum ; D. amœnum ; D. chrysotoxum ; D. cœrulescens ; D. crepidatum ; D. cretaceum ; D. crystallinum ; D. Gibsoni ; D. Griffithii; D. heterocarpum ; D. infundibulum ; D. Macarthiæ ; D. multicaule ; D. nodosum ; D. onosmum ; D. Paxtoni ; D. primulinum ; D. speciosum ; D. tortile ; D. transparens ; D. Bensonæ ; D. bigibbum ; D. Crassinode ; D. Freemanii ; D. Hillii ; D. longicornu ; D. latiflorum ; D. pulchellum ; D. suavissimum ; D. sulcatum ; D. superbiens ; D. undulatum ; D. taurimum ; D. thyrsiflorum ;* and *D. Wardianum ;* one of the grandest of all the species, *D. Wardianum giganteum,* even grander.

CŒLOGYNE.

A genus of Orchids entirely eastern, and mostly natives of the hills of India. The following are met with in Calcutta :—*C. media ; C. rigida ; C. nitida ; C. undulata; C. flacida ; C. ochracea*; likewise the two accounted the most beautiful, *C. cristata*, bearing racemes of fragrant white flowers, four inches across, with beautiful yellow and orange stains on the lip, and *C. odoratissima,* unsurpassed for its fragrance. Also *C. barbata* and *C. massangeana.*

EPIDENDRUM.

This genus, which is said to comprise above three hundred species, is confined almost exclusively to South America. Few, Mr. Warner states, are worth growing except for their fragrance. Those most distinguished for the beauty and size of their flowers are *E. nemorale ; E. Skinneri ;* and *E. prismaticarpum.* The following have been introduced, of which the two last are not uncommon in Calcutta : *E. vitellinum ; E. falcatum ; E. polyanthum ; E. macrophyllum ; E. cochleatum ; E. craslifolium*, a free bloomer bearing upright dense spikes of purplish rose-coloured flowers ; and *E. ciliare*, which bears white spider-like blossoms, two of the petals with pretty eyelash-like fringes. Also *E. grammatophyllum speciosum.*

BROUGHTONIA.

B. sanguinea.—Native of Jamaica. Pseudo-bulbs flat and round, flowers blood red ; thrives and blossoms well in Calcutta.

LAELIA.

A South American genus, containing some of the most superb of the Orchids. They are terrestrial. *L. anceps* ; *L. majalio* ; *L. purpurata* ; *L. superbiens*, accounted amongst the finest, have been introduced into Calcutta, as well as *L. acuminata* ; *L. autumnalis* ; *L. albida* ; and *L. Dayana*.

CATTLEYA.

A genus closely allied to the above, and confined principally to Central America and Brazil. The flowers they bear are accounted to be amongst the largest in the order, some being as much as seven inches across from tip to tip of the petals. They also keep in bloom for 2—3 months. The finest of all is *C. Warscewiczii*. Next to it stand *C. Mossiæ* ; *C. labiata* ; *C. crispa* ; *C. Skinneri* ; *C. Aclandiæ* which have been introduced into Calcutta, and flower well in the grass Orchid-house and conservatory. Also *C. amathystina* ; *C. citrina* ; *C. Eldorado* ; *C. Gaskelliana*; *C. Gigas* ; *C. Imperialis* ; *C. intermedia*; *C. Leopoldii* ; *C. Mendelii* ; *C. Nobilior* ; *C. Percivaliana* ; *C. Sanderiana* ; *C. Speciosissima* ; *C. Trianæ* ; and *C. Warneri*.

BRASSAVOLA.

A genus of Orchids of tropical America remarkable for the fragrance of their flowers, with long-tailed petals. *B. cucullata* and *B. glauca* are met with in Calcutta.

PHAIUS.

A genus of terrestrial Orchids, grown in pots in light, rich soils ; natives of the East, of which *P. maculalus*, with yellow flower, and *Wallichii*, with dull-orange or tawny flowers, are well known in Calcutta. Also *P. Grandiflorus* and *P. Albus*.

THUNIA olim PHAIUS.

T. Bensonæ and *T. alba* are stated to grow well in the open ground, in broken brick beneath a Mango tree, and display their beautiful white flowers in July.

ARUNDINA.

A. bambusæfolia.—A terrestrial Orchid, grown in pots, like Phaius ; native of Nepal, nearly allied to Bletia, a slender, reed-like plant, not uncommon in Calcutta, where, in the month of September, it bears thin purple flowers.

BLETIA.

B. *yacinthina*.—A terrestrial Orchid ; native of China ; begins to start its corms about the middle of November, when it should be re-potted ; a good light leaf-mould soil, with plenty of crocks for immediate drainage, and broad, rather shallow pots, are most suitable to it ; displays its abundance of bright pink flowers in February and March.

B. *verecunda*.—A terrestrial Orchid ; native of the West Indies ; flowers very similar to those of the preceding, borne nearly always, but principally at the end of September, when it throws up long flowering stems three feet high, displaying their flowers in full beauty for more than two months ; ripens abundance of seed during the cold season ; cultivated same as the last.

SPATHOGLOTTIS.

A. *Fortunei*.—A terrestrial Orchid ; native of Hong-Kong ; flower yellow, described as, in character, much resembling the preceding. Cultivation same as for Bletia.

CYRTOPERA.

C. *flava*.—Native of India ; a terrestrial Orchid ; flowers large, golden yellow, very beautiful upon their large spike ; grows in the ground of the common border, where its spike of blossom springs up in May, before any of the leaves appear.

VANDA.

A genus of beautiful Orchids ; natives of Assam and the Khâssya Hills mostly ; many are natives of Bengal. They are all epiphytic, and on that account must be grown attached to blocks of wood and squares of teak.

V. *gigantea*.—A noble Orchid ; flowers large, thick-petalled, expanded, and somewhat resembling buffish-yellow butterflies, upon their fine large, deep-green, handsome foliage.

V. *Roxburghii*.—Native of Bengal ; often met with growing upon the boughs of Mango trees ; flowers above checkered with yellow and dusky ferruginous-purple, beneath white ; not very attractive. There are several varieties ; one entirely of cream colour.

V. *teres*.—Native of Assam and Khâssya ; a curious plant, with pale-green stem-like cylindrical leaves, which vary from the thickness of a cedar-pencil to that of a quill ; flowers large, erect, very handsome, of a pale-rose colour ; the lip having the form of a monk's cowl, large enough to hold a Walnut, deep pink with dark bars, tied on by two broad ribbons below the chin. Not an uncommon plant in Calcutta.

V. cærulea.—Flowers borne in splendid racemes about a foot long, ten or twelve in each receme, having the general form of a star four inches across, with five wavy, pear-outlined rays, beautifully mottled by the reticulations, being of a deep violet blue upon a paler ground of the same colour; the base of the lip small, deep purple, projecting from the centre of the flower. The flowers fade in time to an almost pure white. In full blossom in November. Leaves strap-like, coriaceous polished, and equitant. One of the loveliest and most valued of Orchids.

V. Cathcarti.—Native of Jynteah; flowers very large, rose-coloured externally, petals yellow internally, densely striped with transverse lines of deep orange red. Dr. Lindley says:—"No more remarkable Orchid has been found in Northern India; and though not so showy as the gorgeous Dendrobia (Chrysanthemum, Devonianum, Farmeri, etc.) amongst which it grows, it exceeds any of these in its singularity and in its chaste, elegant appearance.

V. cristata.—Native of Assam; a small plant, bears curious greenish-white flowers, remaining a very long time in blossom, and resembling somewhat a little bird striped with crimson, sitting in its nest.

V. Batemanni.—Native of the Philippines; a stout, erect growing plant, with thick straight leathery leaves. Flowers in large erect spikes more than three feet long, creamy yellow mottle; the reverse rose colour, two and-a-half inches across; of leathery texture, lasting as long as two months, opening in June.

V. Lowii.—Native of Borneo; habit like that of Renanthera, but with larger leaves bending gracefully over. Flowers borne on long pendulous racemes, sometimes eight to ten feet long, being of two distinct kinds on the same spike; the lower ones of tawny yellow, the upper ones pale yellow mottled like tortoise-shell.

V. cærulescens.—Somewhat like *V. cærulea,* but smaller. Spike longer.

V. Denisoniana.—Close in habit to *V. Roxburghii* and *V. Roxburghii* var. *cærulea*; *V. Jenkinsii* and *V. Bensonii*. Also *V. Hookerii*; *V. insignis*; *V. lamellata Boxallii*; *V. Parishii*; *V. Suavis*, and *V. tricolor*.

RENANTHERA.

R. coccinea—CHINESE AIR PLANT.—Native of China; flowers with narrow, bright coral-red petals, of spider-like form, borne during the hot season in immense profusion, and in long succession up on their antler-like flower-stems. This plant is said to be one of the principal favourites in the gardens of the Mandarins. It thrives vigorously in the region of Calcutta, and blossoms to perfection bound to a large upright log by moss fastened with copper wire, and exposed throughout the year to the full power of the sun, as shown in Figs. 33-35.

R. arachnites.—Called also *Arachnis moschifera* ; bears sprays of about twelve flowers, much like huge spiders, five inches across, of a lemon-colour with great purple spots, emitting a delicate scent of musk ; considered one of the most remarkable of all the Orchids. This, like the last, requires full exposure to the sun. Also *R. Lowii* and *R. Storerii*.

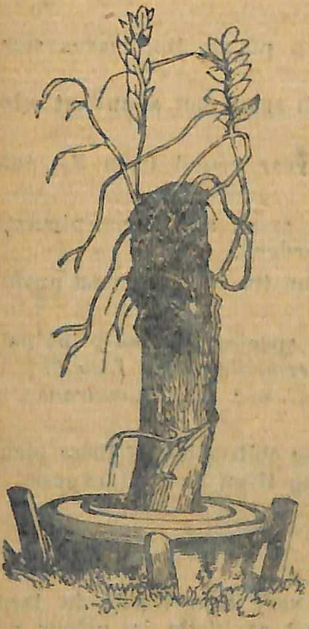

FIG. 33

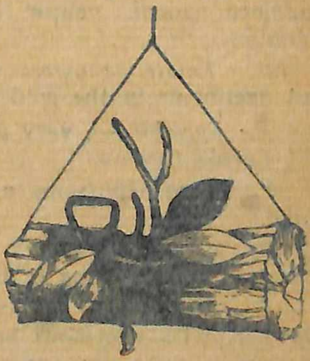

FIG. 34

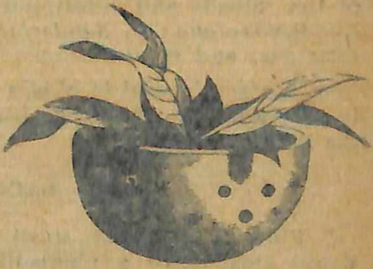

FIG. 35

PHALAENOPSIS.

P. amabilis—QUEEN OF THE ORCHIDS—INDIAN BUTTERFLY PLANT.—Native of Amboyna ; flowers very large, milk white, leathery ; lip marked with purple lines ; resembling a butterfly with expanded wings, lasting unimpaired for several weeks. This most choice and magnificent plant is always grown fastened with moss and copper wire upon a log. It may be easily propagated by binding a piece of moss round one of the joints of the stalks, which will emit

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roots, and may then be removed and attached in the usual way to another log.

P. grandiflora.—Very similar to the last, but lip stained yellow: Mr. Warner states that, as a rule, the specimens from Java have larger flowers and longer spikes than those from Borneo.

P. Schilleriana.—A very beautiful plant for its flattened frosted roots, and leaves similar in form to those of the last, marked with transverse bands and blotches of white. Flowers fragrant, pinkish-mauve, with dark purple spots on the lip.

P. Cornu-cervi.—Spikes of flowers flattened in shape, like a stag-horn, small, yellow barred with brown, not uncommon in Calcutta.

P. Lowii.—Flowers white with deep purple lip, leaves small, and deciduous in the cold season.

P. Parishii.—A very small plant, with small but abundant white and purple flowers.

P. rosea.—Blossoms nearly all the year round from the same spike.

P. Manneii.—Flowers creamy yellow, small and inconspicuous; abundant and thriving in the Botanical Gardens.

F. Schumannii.—Leaves rich purple on the reverse, most profuse bloomer, with enormous branched spikes.

There are besides these the following species, natives principally of the Straits and Philippines :—*P. intermedia*; *P. Listerii*; *P. Luddemanniana*; *P. Sanderiana*; *P. speciosa*; *P. Sumatrana*; *P. tetraspes*; and *P. violaceum.*

The great point to obtain success in the cultivation of these plants is to render the leaves healthy, by keeping them as well exposed to the light as possible.

SACCOLABIUM.

Flowers generally small, but borne very numerously in large, dense clusters of a plume-like form, most exquisite in colour and delicate in character. Grown attached to a log in the same way as Vandas.

S. giganteum.—A magnificent plant from Burma, with broad lightish green leaves; bears in December and January an immense spike with large, very fragrant flowers, white spotted with violet.

S. guttatum (syn. *S. retusum*).—An old-established plant in Calcutta; bears spikes of bloom, a foot or more long, of small white flowers, spotted with rose, described as assuming a tail-like, almost cylindrical form. Also *guttatum* vars. *densiflorum*, *giganteum*, and *Holfordii*. Others known in Calcutta are :—*S. micranthum*;

S. miniatum ; *S. ampallaceum*, var. *Moulmeinensis* ; *S. Blumei* ; *S. denticutum* ; *S. curvifolium* ; *S. Harrisonianum*, and *S. violaceum*.

AERIDES.

Flowers resemble in general appearance those of Saccolabium.

"There is probably no genus among Orchids," says Mr. Warner, "the species of which are more generally ornamental—no species more worth growing. Even when not in bloom, the different species, all similar in habit, are all good-looking objects, from the pleasing disposition of their substantial looking foliage." The flowers are borne upon long spikes, like Saccolabiums, but are smaller in size. Cultivated in the same way.

A. affine.—Native of Assam ; bears rose-coloured flowers.

A. odoratum.—Native of Assam ; bears pretty trusses of bloom with small white flowers tinted and spotted with pink, having the form of a curved horn, and diffusing an exquisite lemon-like fragrance. Also the var. *O. majus*.

The first two have been long well known in Calcutta. Of later introduction, and all of great beauty, are :—*A. Lobbii* ; *A. Fieldingii* ; *A. quinquevulnerum* ; *virens* ; and *A. Lindleyanum*, the last in Mr. Grote's collection, and spoken of by him as perfection. *A. roseum*, and *A. suavissimum*. Also *A. crassifolium* ; *A. crispum* ; *A. expansum leoniæ* ; *A. maculosum* ; and *A. rubrum*.

ANGRÆCUM.

A. superbum.—Flowers large, white, remarkable for the length of the spur ; in one species as much as a foot and-a-half long *A. sesquipedale* is the grandest of the species, with immense spurs. *A. eburneum* and *falcatum* are also worth cultivating. These are terrestrial Orchids, and should be grown in pots.

CYMBIDIUM.

C. aloifolium.—Native of India ; flowers dull purple and russet ; not attractive ; a very common and hardy Orchid ; grows well, left to itself, on the limb of a tree. To be met with also in Calcutta are the Indian species : *C. giganteum*, with racemes of very large brown tesselated flowers ; *C. Mastersii*, with white fragrant flowers and rush-like leaves ; *C. eburneum*, like the last, amongst the largest and sweetest of the genus, flowers large, radical, ivory white, smelling like Lilac ; *C. elegans*, with massive pendulous spikes of yellowish flowers ; *C. lancifolium*, *C. Lowianum* and *Parishii* are recent introductions.

BROMHEADIA.

B. palustris.—Native of Penang; an immensely stout-stemmed hardy Orchid; has been in the Calcutta Botanical Gardens a great many years, but has never flowered.

GRAMMATOPHYLLUM.

G. speciosum.—A Malayan Orchid of giant dimensions, a single plant often covering several square yards of ground. Flower golden yellow, spotted purple, and streaked dull-red, about half a foot across. A very remarkable plant.

G. multiflorum.—Another large growing species from Manila. Flower a curious mixture of green, brown and purple. Numerously produced on long racemes.

G. M. tigrinum.—Said to be a desirable variety of the above.

ONCIDIUM

A genus comprising more than two hundred species, confines entirely to tropical America. Many are natives of the mountain and require no very high temperature. The few known till comparatively recently in Calcutta are *O. ampliatum*; *luridum*; these two are well established, and flower regularly; *O. crispum*; *O. bicallosum*; *O. lanceanum*, accounted the most beautiful of all; and *O. papilio*, the famous butterfly plant.

The recent introductions of this beautiful species are: *O. majus*; *O. aurosum*; *O. bifolium*; *O. Carthaginense*; *O. Cavendishianum*; *O. concolor*; *O. flexuosum*; *O. recurvum*; *O. Kramerii*; *O. Limminghii*; *O. Marshallianum*; *O. ornithorhyneum*; *O. papiliomajus*; *O. tigrinum* (barkeri); *O. varicosum*, and *O. Wentworthianum*. . .

STANHOPEA.

Plants remarkable for the way in which they thrust their spikes of flowers through the bottom of the baskets in which they are suspended. *S. martiana*, and *S. tigrina* thrive well, and have flowered in the Botanical Gardens.

CALANTHE.

C. vestita.—A terrestrial Orchid, native of Moulmein; throws up in the cold season a spike of large milk-white flowers, with deep rosy eye. There is a variety with a yellow eye (Verstita nivalis).

C. masuca.—Native of Northern India; bears purplish flowers in a Hyacinth-like spike. *See* also *C. veratufolia*.

LIMATODES.

L. rosea.—A terrestrial Orchid, nearly allied to the last; very chaste and beautiful, when in the cold season it sends up its deep rose-coloured flowers with crimson spot in the centre.

VANILLA.

The different species of *Vanilla* are said to do best potted in moss, the pots well drained with potsherds, with a trellis for the plants to be trained upon. They are also very ornamental when nicely trained upon a long upright log of wood with the end securely fixed in a flower-pot for a stand (*see* Figs. 32-35). They should be fastened on with a little moss or Cocoanut fibre. Cultivated in this way, I have seen beautiful flowering specimens at the Calcutta shows. They are easily propagated by cuttings of the stem taken off at a joint. The following are pretty common in Calcutta, and bear greenish-white flowers:—*V. alvida; V. aromatica; V. grandiflora; V. ovalifolia; V. planifolia,* which emits a delicious fragrance at night.

ANÆCTOCHILUS.

A genus of terrestrial Orchids. Must be grown in fibrous mould and sand to succeed. Propagated by cuttings and division.

A. setaceus.—A terrestrial Orchid, native of Ceylon, it is called the king of the woods, and grows commonly in the hedgerows.

"The flowers are not at all beautiful, but the leaves are the most beautiful of all the leaves in the world. The ground colour is drak velvety green, tinged with a metallic lustre, curiously inlaid, as it were, with streaks of golden network." *

One of our rarest and choicest plants, always grown in a pot under a bell glass; but the management of it with success has hardly yet been attained.

A. Dawsonianus.—Native of the Indian Archipelago; leaf four inches long, rich olive-brown, with reddish golden veins.

A. ordianus.—Native of Singapore. Rhizomes as thick as a man's little finger; leaves bright metallic green, with delicate golden lines; similar in shape and habit to the last. Both are of more robust habit than any other species, and are deciduous in the cold season when they require rest. Also *A. Lowii* and *A. Xanthophyllum*. Most of the above are common on the hills.

CYPRIPEDIUM.

LADY'S SLIPPER—VENUS' SLIPPER.

A genus of most interesting terrestrial Orchids, formerly found very difficult to preserve, and consequently great rarities in Calcutta:

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* "Cottage Gardener's Dictionary."

but now, since cultivated in grass conservatories, thriving well and blossoming beautifully in the cold season.

The following are those commonly met with:—

C. venustum.—Native of Nepal and the Khâssya Hills; a small very handsome plant, with the underside of its leaves prettily tesselated with purplish black, produces curious large white and russet green flowers, spotted and striped with purple.

C. insigne.—Native of Nepal; leaves pale green, somewhat similar to the above; flowers large, pale tawny green, with spotted lid. *C. Maulei* is a variety with larger flowers of richer colour.

C. concolor.—Native of Moulmein; a very beautiful plant, with strap-shaped, smooth, polished-green leaves, mottled with whitish markings; bears large, handsome, primrose-coloured flowers.

C. Hookeri.—Somewhat like the last, only with marking more decided.

C. niveum.—Native of Moulmein; snow-white.

C. hirsutissimum.—A very hairy plant from Java. Flower four inches across, greenish, shaded purple and dotted brown.

C. barbatum.—From Malacca. Some beautiful hybrids have been raised from this well-known species, of which *C. b. Veitchianum*, *C. b. nigrum*, and *C. b. superbium* are the best.

C. purpuratum.—From Sumatra. Leaf beautifully spotted. Flower greenish purple with the dorsal limb white.

C. Druryi.—Although indigenous to the hills of Southern India, this pretty plant is rare in cultivation. It is after the style of *insigne*, but quite distinct. Other species and hybrids in Indian gardens are:—*C. Boxallo*; *C. calarum*; *C. ciliolane*; *C. Dommianum* (*Selempedium Dommianus*); *C. grande*; *C. Laurensianum*; *C. Lowii*; *Roezlii*; *C. Sedeni*; *C. Selligrum*; *C. Stonei*; *C. calceolus*. *C. spectabile* and many others. There are over 80 species and varieties cultivated in Kew Gardens. The best way to grow these plants is in pots filled with broken charcoal, large pieces of brick, some well-decayed leaf mould, a little peat and silver sand. Protect from the direct rays of the sun.

ODONTOGLOSSUM.

A very extensive genus of American Orchids, natives chiefly of Mexico and Columbia. They comprise over 150 species and varieties, most of which are very beautiful. Their cultivation has not been attended with much success in this country, being mostly what are known as 'Cool Orchids,' blooming in the winter months even in England. They are recommended for cultivation under glass at northern hill-stations. In the south, many species would thrive in the open. The following varieties are met with in gardens:—*O. Alexandræ*; *O. citrosmum*; *O. Londesboroughianum*;

O. Vexillarium ; O. crispum ; O. cirrhosum ; O. grande; O. G. Williamsianum ; and others.

MOMEORDES.

A small genus of Mexican Orchids of no great beauty. They do not succeed very well in this country, the family being represented by a single species, *M. loxatum eburneum*, to be met with in one or two gardens about Calcutta.

BRASSIA.

B. maculata gigantea.—This fine Orchid is only rarely seen in India. It, however, deserves a place in very good collection.

HABENARIA.

(*Plantanthera.*)

H. Susannæ.—This fine terrestrial Orchid is abundantly found wild on the Western Ghauts, and should succeed at hill stations. It has a robust stem of 3 to 4 feet, which terminates in a short raceme (3 to 5 flowered) of large, white, fragrant flowers. The latter appear in September. During the dry season the plant is deciduous. Several other species of Habenaria are worthy of a place in the garden.

EULOPHIA.

An extensive genus of terrestrial Orchids, of which several are good subjects for the rockery. They are mostly deciduous during the dry season ; but soon appear when the rains set in. Many of them flower before leafing. The best species for garden culture are *E. flava*; *E. virens ; E. candida ; E. campestris* and *E. nuda*.

POGONIA.

A small genus of tuberous rooted, one-leaved, deciduous herbs. *P. plicata*, rarely seen in gardens, is a curious little plant suitable either for pot-culture or the rockery. A short flowering stem bearing rosy-pink flowers is succeeded, shortly after the S. W. monsoon begins, by a single leaf, which remains flat on the soil. It resembles a small Begonia leaf, being beautifully coloured, purple with green and pinkish tints.

HYDROCHARIDEÆ.

VALLISNERIA.

V. spiralis.—An aquatic herb of botanical interest on account of its peculiar method of pollination. This is described most charmingly

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by Maeterlinck in his essay "The Intelligence of Flowers" in the volume entitled "Life and Flowers." Common in tanks and canals. Flowers small, diœcious. Leaves long, linear, translucent and submerged.

OTTELIA.

O. alismoides.—An interesting aquatic commonly found in sheltered tanks and ponds. Flower solitary within a spathe, pure white, one inch broad. Floating leaves oblong to nearly orbicular on long petioles. This plant deserves a place in the garden pond. It does best in shallow water (say, six inches deep) but stands flooding to four feet deep at intervals.

CLASS DICOTYLEDONES.

SALICINEÆ.

SALIX.

S. Babylonica.—WEEPING WILLOW.—Thrives tolerably well in all parts of India, in situations where it receives a sufficient supply of water; but is often very short-lived, and from some unknown cause, apt to die off very suddenly. Propagated readily by cuttings during the rains. Several other varieties also exist in an indigenous state in this country, but they are unsuited for a garden, not being sufficiently ornamental to entitle them to a place therein. The weeping variety is common enough on the hills. *S. tetrasperma* is the country Willow of S. India. A Willow (botanical name unknown) called the Kandahari Willow is grown most successfully near Quetta.

CUPULIFERÆ.

THE OAK FAMILY.

An order of trees and shrubs mostly confined to the Northern Hemisphere. Indian species are somewhat abundant in the Himalayas, but do not occur on the plains. A few of them, and also some Japanese species, have been planted at hill stations throughout the country.

CASUARINEÆ.

CASUARINA.

Suru.

C. equisetifolia.—The Tinian Pine or Beefwood Tree. A lofty tree of rapid growth in most parts of India. Introduced from Northern Australia and the Malay Islands. The soft sighing of the air, on the stillest day, through its numberless slender branchlets, is an agreeable and well-known sound, reminding one of the distant sea washing upon the shore. Cut to 4 or 6 feet and periodically clipped, it forms a dense and beautiful fence. It attains great perfection in a loose sandy soil near the sea. As an avenue tree it is somewhat troublesome, on account of the needle-like leaves, which are constantly falling. Of several species introduced from Australia, the one under notice has alone become familiar in the country. The seed is small and must be raised with care. It is best sown on the surface of soil in boxes, covered with light gravel, and watered by capillarity.

Casuarinas grow in Bangalore, on the Bombay coast, in the Deccan, in Sind, and in an enormous variety of places and climates.

PLATANACEÆ.

PLATANUS.

P. orientalis—THE ORIENTAL PLANE.—This grand tree is indigenous to Cashmere and other parts of Northern India. It grows to perfection in Baluchistan. Efforts to establish it at Bangalore failed. It should be tried at Ootacamund and Kodaikanal.

URTICACEÆ.

Nettle and Fig Family.

URTICA.

U. pulchella.—A small herbaceous shrub of beautiful foliage; leaves borne in a whorl on the summit of the stem, lanceolate, 3 to 4 inches long, of a pure deep green on the upper surface, and prettily netted over by the strongly marked veins. The under-surface of a pure silver white hue.

U. salicifolia.—A low shrub; leaves Willow-like, dark green on the upper surface; dead white underneath, ornamental. Both species are propagated by cuttings and offsets, also seed, when procurable.

LAPORTEA.

L. schomburgkii versicolor.—A fine-foliaged plant, remarkable for the beauty if its leaves. Needs protection in the conservatory, and requires a large proportion of leaf-mould in the soil. Propagated by cuttings during the rains.

L. longifolia.—Recently introduced. Forms a crown of long lanceolate leaves of a dark purple colour mottled with green. A very effective plant. Propagated and protect as for the first named. Note that Laporteas are usually stinging plants requiring to be handled with caution.

PELLIONIA.

A comparatively new genus of mostly creeping herbs with prettily marked foliage. Natives chiefly of tropical Asia, and thriving well in this country. The species grown in our grass conservatories are all creeping plants with curious succulent leaves of a greyish hue, more or less blotched with green. They are admirably suited for rockeries and hanging baskets, and thus grown, have a fine effect. They require a moist atmosphere and root freely from nodes in contact with the soil. The species found in gardens are : *P. daveanana*, *P. daveanana argenta*, with silver-coloured leaves ; and *P. pulchra* of a purplish colour ; *P. viridis*, bright green, mottled with white.

BŒHMERIA.

B. nivea—CHINA GRASS.—This noted fibre shrub has a pretty effect in the shrubbery, when the wind exposes the white underside of the leaf. Easily raised from cuttings and division of the tubers. From this plant the Rhea fibre of commerce is obtained.

DEBREGEASIA.

D. velutina.—In foliage not unlike the Bœhmeria, but a much larger shrub. Very ornamental in fruit, the latter being orange-yellow, the size of a large Current and clustered all over the branches. Does not succeed on the plains.

PILEA.

P. gardneri.—The Artillery or Cannon Plant, so called as the fruit dehisces with a little bang. A pretty semi-succulent herb of a diffuse or creeping habit, taking root as it goes along. Most useful for covering the surface soil in tubs and pots. It soon forms a pretty bank. This may be a variety of *P. microphylla*. Another species of the same habit in local cultivation, but having larger smoother leaves, is unnamed. For horticultural purposes the plant is propagated by cuttings.

DORSTENIA.

A genus of American herbs with a curious inflorescence on a flattened receptacle, but cultivated for the ornamental character of their leaves. The species introduced for cultivation do well in moist plant-houses ; they also grow in the open in Lower Bengal and Mysore. An open soil composed of leaf-mould, sand and loam is suitable. Propagated during the rains by cuttings and the division of offsets. The rarest kinds, some of which are not yet introduced, are: *D. argentata*, silvery ; *D. braziliensis*, *D. Mannii* ; *D. maculata* and *D. tubicina*.

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FICUS.

F. Heterophylla var. *repens*—INDIAN IVY.—Native of Assam : a lovely creeping plant with small verdant heart-shaped leaves that covers a low wall in the shade, or the trunk of a tree, with a dense mantle of most refreshing green ; attaching itself by means of its numerous rootlets in the manner of Ivy. Fruit nearly as large as the edible Fig. Many buildings in Calcutta are entirely covered over with this plant. It requires lime for its growth.

The horticultural names of other wall-creeping varieties in cultivation are *stipulata, scandens* and *minima*.

F. eburnea.—Cultivated by nurserymen as a fine-foliage plant. The midrib and principal veins of the large glabrous leaf is boldly marked ivory-white. In this country the plant soon becomes uniformly green.

F. Benjamina—THE JAVA FIG.—For scenic effect, whether in groups, avenues, or as a single specimen, this graceful evergreen tree is one of the finest in cultivation. It is of quick growth and soon attains large, wide-spreading dimensions. Branches pendent or drooping ; leaves small, ovate, smooth and shining. Fruit in scattered sessile pairs, rusty red, the size of a large Pea. Propagated by layering.

F. Roxburghii.—Large compounds should not be without a specimen of this fine tree, remarkable for the large size of its fruit and leaves. The latter are roundish, nearly a foot in diameter and beautifully tinted when young.

Although but a limited number of the herbs and shrubs of this large family (Urticaceæ) are of horticultural value, this cannot be said of its trees (including the genus Ficus), of which there are many valuable species. Of the latter, a few of the more desirable are here named :

Ficus macrophylla—Moreton Bay Fig.
,, *elastica*—India Rubber Tree.
,, *Cunninghamii*—Queensland Fig.
,, *religiosa*—Peepul Tree.
,, *Bengalensis*—The Banyan.
,, *Mysorensis*—The Goni.

The following are ornamental trees of other genera belonging to this order.

Antiaris toxicaria—The Sack Tree.

Artocarpus integrifolia—The Jack.
,, *hirsuta*—Wild Jack.
,, *incisa*—Bread Fruit Tree.
,, *Cannoni*—Introduced. The nearest approach we have, in foliage, to the copper-coloured beech at Home.

CSL

Castilloa elastica—American Rubber Tree.
Broussonetia papyrifera—Formosan Paper Tree.

EUPHORBIACEÆ.

PEDILANTHUS.

P. tithymaloides—ADJUTANT'S HEDGE—JEW'S SLIPPER—A roadside weed, with sylindrical, succulent stems, and dark green, thick, fleshy leaves ; bears small, crimson, misshapen, unattractive flowers. Sometimes used for the skirting of borders ; should be kept closely clipped. The variegated form is pretty. Propagated by cuttings.

EUPHORBIA.

E. Bojeri.—A shrubby, succulent, thorny-stemmed, Cactus-like plant, always in blossom, but particularly in the hot season with flat quadrangular, very symmetrical trusses of most brilliant vermilion flowers ; requires a situation fully exposed to the sun, will grow nearly anywhere, but most thrivingly in a mixture of brick-rubbish, leaf-mould, and charcoal. Propagated by cuttings.

E. splendens.—Not to be distinguished in any very marked degree from the last, except that the stems are somewhat more slender and more spinous.

E. jacquiniflora.—A small shrub ; in blossom one of the most brilliantly beautiful pot plants of the gardens; blossoms in the middle of the cold season with a profusion of small, dazzling vermilion flowers from the extremity of, and all down its long, smooth, slender-twig-like stems. If, some time before blossoming, each stem be bent and fastened down over the rim of the pot, young shoots will break forth and enhance the beauty of the plant by the additional flowers they produce. After flowering the stems may be cut in, and the cuttings, when dry of the milky juice which exudes from the cut part, be put in a pot of sand in a shady place. In a short time they will take root. Some, however, consider that cuttings strike more readily if made in the cold weather, before the plants have flowered. The plants are very apt to die off in the rains if left much exposed to wet.

The late Mr. R. Scott, of the Calcutta Botanical Gardens, raised a dwarf and very distinct permanent variety of this beautiful plant. The announcement of it Firminger gives in his own words from the "Journal of the Agri-Horticultural Society":—

"Two years ago, at one of the shows of the Agri-Horticultural Society, I saw a plant of Euphorbia jacquiniflora, with branches about seven feet long, and said to have been the growth of one season. The accompanying plants showing what may be accomplished in the opposite direction, are ten months old, from cutting, and as the appearance bespeaks, have been starved as long as could be done with safety to the plants, which have been allowed to 'form' themselves. No stopping, pruning or bending of the branches or twigs has been practised upon them."

E. meloformis.—A deeply ribbed, Melon-formed succulent, only found in Botanical Gardens. Flowers greenish ; suited for pot-culture and dry rockeries.

E. tirucalli—THE MILK-HEDGE.—This small succulent tree is abundant throughout the country. Often planted as a fence and admirable for this purpose in districts of under 20 inches rainfall. Needs to be closely cut back.

E. neriifolia ; *E. Nivulia* ; *E. Antiquorum* ; and *E. tetragona* are succulent shrubs planted as field and boundary fences in many parts of India and erroneously spoken of as Cactuses.

POINSETTIA (Euphorbia).

P. Pulcherrima.—A very large spreading shrub, eight to ten feet high ; native of Mexico ; bears during all the cold season little knobs of insignificant flowers surrounded by rays of large, elliptical, crimson-scarlet, bracteal leaves. When in full blossom one of the most gorgeous objects conceivable. Blossoms upon the wood of the current year, which should be cut in to a bud or two from the base after flowering. No plant strikes more readily from cuttings. Is apt to suffer badly if transplanted in dry weather. *P. Pulcherrima,* var. *albida.*—A variety with the bracteal leaves of a greenish white ; of little beauty comparatively. *P. plenissima* is double.

DALECHAMPIA.

D. Roezleana rosea, of late introduction, and *D. Madagascariensis* ; slender, pretty climbing plants. They bear insignificant greenish flowers surrounded by bracteal leaves of a beautiful colour, and veined with green. Propagated by cuttings in the cold season.

PHYLLANTHUS.

The flowers of this genus are curious, but not showy. In the species here named the foliage is pretty. They are shrubby plants of rather slender growth, and the variegated forms make very pretty hedges. Under rich treatment they are apt to lose the variegation. Easily raised from cuttings.

P. atropurpureus.—A deciduous shrub. Foliage changing from dark green to dark purple. Plant in light sandy soil.

P. nivosus.—Also deciduous. Foliage nearly pure white or slightly streaked with green, a very effective plant both in pots and in the ground.

P. rosea-picta.—Foliage rosy purple, very effective. Probably a variety of nivosus. Other deserving species are *P. Seemannianus, Chautrieri and P. speciosus. Phyllanthus emblica* (awla) and *Phyllanthus distichus* (harparowri) are common jungle species with edible fruits.

EXCÆCARIA.

E. bicolor.—A shrub of moderate size, and in respect of its foliage one of the most beautiful of the garden. Leaves lanceolate, four or five inches long, of a bright olive green on their upper surface, and of a rich deep crimson beneath; bears in the cold weather minute insignificant flowers. A spring or two produces a fine effect in a bouquet. Propagated readily by cuttings during the rains. *See* also *E. Cochinsinensis.*

BREYNIA.

B. Rhamnoides—INDIAN SNOWBERRY.—A common jungle shrub covered in the cold season with small white berries. Makes rather a good hedge. Raised from seed and cuttings.

MANIHOT.

M. Glaziovii—CEARA RUBBER TREE.—Mentioned here for its ornamental effect while in leaf. It suffers badly from sun scorch and is best grown in damp districts. *Manihot utilissima* is Tapioca.

SYNADENIUM.

S. Grantii—AFRICAN MILK-BUSH.—Being of quick growth and fine appearance, this large succulent shrub is most useful for covering unsightly objects such as a wall or godown. Deciduous only in a dry climate like Mysore. Easily raised from cuttings.

GELONIUM.

G. lanceolatum.—A pretty evergreen tree, or conical form, especially the male or staminate tree. Suitable for avenue and lawn planting.

JOANNESIA.

J. princeps.—This handsome Brazilian tree is fairly established in public gardens, where its large ash-coloured fruit is an object of curiosity. The latter is something like a Cocoanut in form, but smaller and slightly 4-angled. Being bare of leaf for only a few days, it makes a good avenue tree. Propagated from seed.

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ACALYPHA.

A. densiflora.—A shrub about two feet high, has oval, pointed leaves, and bears during the year throughout drooping festoons, ten inches or a foot long, of pale, bright-red, minute flowers, altogether similar in form to those of Love-lies-bleeding. Propagated readily by cuttings or by division during the rains. *A. tricolor, A. glabrata*, and *A. marginata*. are remarkable for the beauty of their leaves. A tricolor grows from six to ten feet high, with leaves of blotched, mottled, and splashed with red and crimson on coppery-green ground. The following, which are all cultivated for the beauty of their foliage, have been recently introduced :—*A. illustrata ; Macafeecana ; Macrophylla ; Musaica* ; and *obovata*. The last named is an evergreen shrub of fine dense growth, and is largely used for decorative purposes in Calcutta.

A. Hamiltoniana, hispida, and *Godseffiana*, are fine plants, recently brought into cultivation. Acalyphas are propagated by cuttings.

JATROPHA.

J. multifida—CORAL PLANT.—A very common large herbaceous shrub, rather ornamental when kept down to a moderate size ; foliage rather pretty, with large, much-slit, vivid bluish-green leaves, above which rise the bunches of small flowers somewhat resembling pieces of red coral. Propagated by the large nuts, which it bears abundantly. PHYSIC NUT.—The Physic or Purging Nut—*Jatropha curcas*, is a common hedging plant of the country.

J. panduræfolia.—A beautiful flowering shrub, of moderate size, with dark, shining, fiddle-formed leaves, met with in nearly every Indian garden ; bears during the hot and rainy seasons panicles of middling sized, bright-crimson flowers ; requires to be severely pruned in the cold season to prevent it from becoming scraggy ; propagated readily by cuttings or by seed, which it ripens in the cold season. A variety is not uncommon with rose-coloured flowers, found rather shy sometimes of opening its blossoms.

J. integerrima.—A species in the Calcutta Botanical Gardens, in all respects very similar to the last, except in the form of the leaf.

J. podagrica.—A gouty-stemmed shrub, having cymes of pretty orange-red flowers on longish stalks. Ugly when not in flowers. Suitable on a rockery. Propagated by division. *Jatropha gossypifolia* is a weedy shrub of waste land.

RICINUS.

R. communis—PALMA CHRISTI—CASTOR-OIL PLANT.—*Erandi*.—large herbaceous shrub, common in all parts of India. The variety with scarlet blossoms, contrasting finely with the rich green, large palmate leaves, would set off any out-of-the-way or unoccupied spot of the garden to great advantage. The variety *Gibsonii*, with large purple-bronze leaves, is effective in the shrubbery. Propagated by seed. Best sown in the Deccan and Upper India (plains) when the rains break, but may be sown up to three months later. The plant is astonishingly hardy and tolerates the rigorous climate of Sind. There is a well-known Sanskrit proverb to the effect that where nothing else is available the Castor plant is a tree (corresponding to the proverb about the one-eyed man being a king among the blind).

CROTON.

A genus of handsome, ornamental-leaved plants, natives chiefly of the Moluccas. but perfectly naturalized in this country. The correct botanical name of the genus is *Codiæum*, but the name Croton is so commonly used that it may be retained. During recent years they have risen greatly in popular favour for decorative purposes—and deservedly, for anything more beautiful and varied in the colouring of the leaves of these plants it is impossible to conceive. A single plant in the various stages of its growth will exhibit such a variety of tints and distribution of colour as to puzzle even an experienced cultivator as to its identity—for there are over 300 varieties in cultivation, all named. For gardens of modern extent, about fifty of the best kinds will be found quite sufficient, and these should be of distinct habit and coloration of the leaves. It will, however, be found that, to select even so large a number as fifty, the task will be no easy one for every individual variety possesses charms which renders it particularly desirable to include it in the fifty.

Crotons are very easy of culture, and are perhaps the hardiest of our decorative plants. They will thrive and make good growth in almost any soil and under the most unfavourable conditions. But to grow them to perfection, so as to develop to the fullest extent the gorgeous colouring of their leaves, they must have almost absolute shade. Our grass conservatories are admirably adapted for this purpose. It is here that they are seen at their best. They make splendid potted plants ; but obviously they grow best in the ground, where the roots have greater freedom. No one, however, need expect to cultivate Crotons successfuly unless efficient drainage has been provided in pots. If it is only borne in mind that plants, like animals, can only absorb and assimilate a certain amount of food, which the roots take up in the form of moisture : and that anything beyond their proper requirements *must* prove injurious to the health of the plants, the question of thorough drainage would be better understood, and more rigidly enforced in the case of *all* plants. Unless the drainage is efficient, the soil becomes waterlogged, sodden, and sour, because the plant is *unable to assimilate* such a quantity of moisture. In the case of Crotons, water-logging means certain death of the plant in a short time.

Any common garden soil will grow Crotons ; but that which suits them best is made up as follows:—One part well-decayed cowdung, one part leaf-mould, one part garden loam, half-part river sand, and half-part old mortar or concrete, broken up fine, like coarse *soorkee.* They will come to great perfection in this. At places distant from the sea, occasional mild doses of salt-water have a beneficial effect.

The best mode of propagation is by cuttings put down in the rains, in pure river sand (they root most quickly in pure sand). In a month or six weeks they will have formed a lot of roots, and the young plants should then be potted off singly in two and three inch pots, in which they should be allowed to remain until the pots are filled with roots, when they should be moved into pots a size larger until the end of the following February.

The plants begin to make their new growth about the end of February or beginning of March, according as the season is early or late. They should at this time, i.e., just before they begin to put forth new leaves, be repotted into entirely fresh soil. They should be liberally supplied with water at this time, and during the whole of the hot summer months. An occasional application of liquid manure—say, once a week—will benefit them immensely. By this mode of treatment the plants remain compact and busy, and do not run into "leg," as is too often the case with Crotons left to themselves. The soil around the roots should be stirred up at least twice a week. If done in the morning, the plants should not be watered till evening. This is a very essential operation for the successful cultivation of plants in pots.

On the hills Crotons must be grown under glass. In all other respects the treatment recommended for the plains is equally applicable on the hills.

It would become tedious to describe all the Crotons in cultivation ; and, moreover, would serve no useful purpose. It has therefore been considered sufficient to give the names of fifty of the best varieties which will be suited for general purposes, whether decorative or for exhibition.

The following are the names of some of the varieties now grown :—

Alexandra.
Aucubæfolius-giganteus.
Aucubæfolius-superbus.
Aureo-marmoratus.
Aureo-spiralis.
Bachii.
Bergmanii.
Beauty.
Brageeanus.
Challenger.
Cronstadtii.
Chrysopœcilus.
Dayspring.
Duchess of Edinburgh.
Duke of Albany.
Fenzii.

Fijiensis.
Gloriosus.
Gordonii.
Grande.
Imperator.
Imperatrice Eugenie.
Indian Prince.
Kingianus.
Lindenii.
Little Gem.
Lowii.
Macafeeanus.
Macarthuri.
Magnificum.
Maharaja of Durbhanga.
Mariesii.
Mooreanus.
Mortii.
Mutabilis.
Pink Pearl.
Prince of Orange.
Prince of Wales.
Rheedii.
Rubro-marginata.
Rubro-vittatus.
Schomburghiana.
Sir Ashley Eden.
Sir Richard Garth.
Sir W. MacArthur.
Sunset.
The Czar.
Thomsonii.
Variabilis.
Warrenii.
Westii.

XYLOPHYLLA.

X. *elongata*—(now called Phyllanthus). A curious and very ornamental small shrub, with small lanceolate leaves, along the edges on which are borne the minute pale-green flowers, upon short footstalks as fine as hair; nearly always in flower, but more particurlarly so in October and November, when it is densely covered with its mealy-looking blossoms, which diffuse for some distance around a smell like that of seed-cake. The so-called leaves are phylodes or flattened stems. Propagated by cuttings in the rains.

X. *angustifolia*.—In nearly every respect similar to the last but of dwarfer growth; ripens seed abundantly in November.

ERIOCOCCUS.

E. *glaucescens*.—A small shrub, rather pretty, and curious for bearing its minute flowers upon hair-like stems along the edges of the leaves, like those of the preceding genus.

E. *sp*.—An unnamed species in the Calcutta Botanical Gardens somewhat similar to the last, but not so pleasing a plant.

BUXUS.

B. *sempervirens*.—Common Edging-Box of the English gardens. Two or three stunted specimens in small pots just manage to exist, and that is all, in the Calcutta Botanical Gardens. A Ootacamund and Kodaikanal there are fine hedges and bushes of the common box. No doubt it thrives well at northern stations such as Darjeeling, Mussoorie, and Simla.

B. *Chinensis*.—Somewhat similar to the preceding; thrives tolerably well here, and possibly might answer for forming an edging if kept constantly clipped in.

SANTALACEÆ.

SANTALUM.

S. album—SANDALWOOD TREE.—A small indigenous tree mostly found in Mysore and parts of the Bombay Presidency. Not ornamental. Wood valuable for its remarkable fragrance. Easily propagated from seed. The plant is a root-parasite. Its roots penetrate the roots of neighbouring plants and suck nourishment from them.

LORANTHACEÆ.

LORANTHUS.

A large genus of evergreen parasitic shrubs, found growing on tree and bushes all over the country. Some species have really attractive flowers of orange, yellow, reddish, and greenish tints. But all being destructive to valuable trees, the gardener and forester must treat them as srious pests, to be deligently removed when observed. The most destructive species are :— *L. Wallichianus ; L. obtusatus ; L. cordifolius ; L. tomentosus ; L. cuneatus ; L. longiflorus* and *loniceroides*. The Mango tree suffers especially from Loranthus, and the pest should be cut out wherever seen.

VISCUM.

V. album—THE MISTLETOE.—This parasite is found throughout the Temperate Himalaya at 3,000 to 7,000 feet elevation.

ELÆAGNACEÆ.

ELÆAGNUS.

OLEASTER.

E. dulcis.—A shrub of small size and erect growth ; ornamental, the small oval leaves being of a silvery hue on the under-surface.

E. hortensis angustifolia is a small tree or spiny bush of ornamental appearance. Flowers fragrant. Propagate by seeds and cuttings.

E. glabra and E. pungens are species having pretty variegated forms, of which several are found in Indian garden. The fruiting properties of the genus will be found in another place in this work.

THYMELÆACEÆ.

DAPHNE.

D. Fortuniana.—A small ornamental shrub, native of China, with very neat pretty foliage, bears, at the beginning and close of the cold season, handsome umbels of dark-lilac salver-shaped flowers more than an inch long. A single plant was for some years in the gardens of the Agri-Horticultural Society, introduced originally by Mr. Fortune. In China it is said to blossom in the leafless stage. Here it does not lose its leaves and seems to bear the climate very well, though making little growth.

D. viridiflora.—A neat little shrub with small leaves; of no particular merit; bears, at the start and close of the cold season, umbels of small, greenish-yellow, insignificant flowers, and yellow Pea-like berries in January.

GNIDIA.

G. eriocephala.—A small neat-looking shrub belonging to Southern and Eastern Africa with narrow lanceolate leaves about two inches long; bears in February crowded heads of rather small pale-yellow flowers; very pretty when in full blossom. Propagate from cuttings in November.

PROTEACEÆ.

A numerous order of very curious and interesting trees and shrubs comprising the beautiful species of Banksia, Protea, Hakea and Dryandra, natives almost exclusively of the Cape and Australasia, of which scarcely a single plant has been found capable of living in the plains of India. Some species of the above genera have succeeded in the cooler parts of India.

GREVILLEA.

THE SILVER OAK.

G. robusta.—A lofty tree, native of Australia, where it rises to the height of from 100 to 120 feet; a most noble object, handsome at all periods of its growth, with deeply incised, Fern-like, rich, dark-green leaves: silvery on the under-surface; bears in March greenish-yellow flowers mixed with orange, of moderate size. This, which is about the only Proteaceous plant we have, has become quite established in our gardens in places where the climate suits it, though it does not attain to any great height here—such places are hill stations wih moderate rainfall and temperature and without frost. Propagated only by seed. Extensively planted in Southern India as a shade-tree for Coffee.

G. buxifolia.—A small, pretty, box-leaved shrub from Australia.

LAURINEÆ.

CINNAMOMUM.

C. Zeylanicum—CINNAMON-TREE.—A tree of moderate size having large lanceolate with three parallel nerves; bears in

January and February numerous pretty panicles of small white flowers, emitting rather an unpleasant odour, and possessing none of the fragrance for which the leaves and bark are so well known. Propagated by seed.

C. camphora—THE CAMPHOR-TREE.—In addition to its economic value, this is a fine evergreen tree which does well in sub-tropical and warm temperate India. Propagated from seed. One or two species of Litsæa are also pretty trees of the same region.

LAURUS.

L. nobilis—SWEET BAY.—Does not seem to thrive at all in this country. Only poor small specimens in pots are to be met with. Thrives better on the hills.

CALYCANTHACEÆ.

CALYCANTHUS.

C. floridus—CAROLINA ALLSPICE.—A woody unornamental shrub with rough, large, coarse, lanceolate leaves which, in a cold climate, are said to become very ornamental, as in decaying they turn to a bright yellow. The wood and roots smell strongly of Camphor. Flowers described as "dusky purple or dull brown, very fragrant, with a sweet Apple-scent, or odour of ripe Melon:" thrives well, but does not blossom in the locality of Calcutta.

CHIMONANTHUS.

C. fragrans—JAPAN ALLSPICE.—Like the last, a coarse-looking, straggling, woody shrub; flowers yellowish, purple within, of the size of an unexpanded Peach blossom, of a most exquisite and powerful odour. In England it is usually trained against a wall, where it blossoms in the depth of winter. It was introduced some years ago from China by Mr. Fortune into the gardens of the Agri-Horticultural Society, where it throve well, but did not blossom, forming blossom-buds, which dropped off without opening. The roots possess a delightful fragrance; easily propagated by layers. *C. fragrans grandiflorus* is a variety with larger flowers.

MYRISTICEÆ.

MYRISTICA.

M. fragrans—THE NUTMEG TREE.—A native of the Eastern Moluccas. Cultivated sparsely in some of the cooler parts of Southern India. Flowers small, pale-yellow. Nut ovoid or pyriform, nearly two inches long. Tree raised from seed.

M. Magnifica.—The wild Nutmeg tree of the Western Ghauts: supposed to be one of the grandest trees in Southern India. Only suitable for the hills.

CSL

PIPERACEÆ.

A large genus of Indian twiners, of which the Betel-leaf Vine, *Piper Betle*, is the best known. Long black, and white Pepper are well-known products of the genus. The ornamental species are *P. decurrens* ; *P. excelsum aureum-pictum* ; and *P. porphyrophyllum*. All are propagated by seeds and cuttings.

PEPEROMIA.

A genus of ornamental herbs with prettily marked leaves. The latter are mostly fleshy, cordate, and produced in a thick cluster so as to conceal the short rootstock. A light soil, composed of leaf-mould, sand, loam and bits of old mortar, the whole being properly mixed and well drained, will cause vigorous growth, in a shady position. Some hardy species, especially the indigenous ones, succeed on a moist stump of wood with moss tied ground.

The species in cultivation are *P. arifolia* with green and grey, ovate, leaves ; *P. argyreia* (syn. *Saundersi*), leaves large roundish cordate, broad, silver striped on bright green ; *P. prostrata* (syn. *brevipes*), slender, brown and light-green, a good basket plant ; *P. eburnea*, ivory-petioled, compact and pretty ; *P. marmorata*, the green and white in the leaf beautifully marbled and reticulated ; *P. nummulariaelfolia*, a good basket plant. Easily raised by division of the side shoots. All are neat, compact plants suitable for small pots, baskets, and rockeries.

ARISTOLOCHIACEÆ.

ARISTOLOCHIA.

BIRTHWORT—PELICAN-FLOWER.

Several of these plants bear flowers of a most curious and indescribable form. The Aristolochias are plants depending on flies for their pollination. To attract these insects they produce peculiar splotched red flowers with a nauseous odour, which are very attractive to carrion-loving flies. The flowers are also traps which ensure that, after the fly has once entered, it does not escape until the work of pollination is completed. The fly is hindered from escaping by hairs in the throat, and also by the curious curve of the flower. The fruit is a peculiar structure which, when dry, assumes the form of a censer, and, as it swings about, sows its numerous flat light seeds on the passing air. The following are selected species:—

A. labiosa.—A common and very extensive large-leaved climber, requiring a stout trellis for support ; bears in the hot season large flowers, somewhat resembling an inflated bag below with a helmet above, yellowish-white, blotched with brown and purple ; emitting a most offensive smell, like that of tainted meat.

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A. Brasiliensis.—A large climber, with large heart-shaped leaves ; bears yellowish flowers.

A. acuminata.—A native of Bengal ; blossoms in the hot and rainy seasons with large, drooping, dark greenish purple flowers.

A. caudata.—A small climbing plant about three feet high, with slender stems and bluntly three-lobed leaves ; bears in the cold season curious liver-coloured flowers, letting hang down from their summit a tail or thread-like appendage two feet long ; commonly grown in a pot, and well suited for its singularity for a place in the verandah.

A. gigas.—This remarkable plant—the largest flowering of the genus—usually takes a back seat in the garden on account of its very offensive smell when flowering. The flower is much inflated, very large and is provided with a tail nearly three feet long. Mottled crimson, purple and grey are the prevailing colours. Propagated by layering.

Desirable species recently introduced in Indian gardens are: *A. sipho ; A. goldieana ; A. Duchartrei ; A. ornithocephala* ; *A. elegans* and *A. ridicula*.

NEPENTHACEÆ.

NEPENTHES.

PITCHER-PLANT.

A remarkable genus of evergreen, trailing, or climbing plants of which only one species, *N. khasiana*, is indigenous to India proper.

The several species of Pitcher-plant are natives principally of the Malayan Archipelago ; and though occasionally introduced into the Calcutta gardens, seldom seem to survive long in the climate of that locality. The flowers they bear are small and uninteresting. Their ornamental character consists wholly in their curiously-formed leaves, some of which end in a tendril, bearing at its extremity a pitcher, in some species coloured most gorgeously. These pitchers are traps for insects which, attracted by their colour, walk on the edge of the pitchers and fall into them. The inside is too smooth to give foothold, and an incurved rim prevents escape. The flies finally fall into a liquid in the bottom of the pitcher where their bodies are digested. The plant depends for much of its nitrogen on this supply of insects. Pitcher-plants succeed best in a moist atmosphere, where the temperature ranges from 70° to 85° or a few degrees less during winter. They are excellent basket plants when planted in a compost consisting of equal parts of peat, leaf-mould and sphagnum. They are propagated from cuttings, layers, and seeds.

N. distillataria.—Native of Singapore ; bears cylindrical pitchers of the same colour exactly as the leaves. A large plant of this species, trained upon a trellis, planted in the ground beneath the shade of trees, was thriving well in the Calcutta Botanical Gardens, but it perished suddenly.

The species found in conservatories and thriving tolerably well, are *N. gracilis*; *N. lænis*; *N. Madagascariana*; *N. rafflesiana insignis*; and *N. sedenii*. Of the fine hybrids raised in Europe, *N. northiana*; *N. rubro-maculata*; *N. Mastersiana* and others should be tried. At hill-stations these plants require the shelter of glass.

POLYGONACEÆ.

POLYGONUM.

P. chinense.—A large herbaceous plant, native of the Mysore hills; bears, during all the cold season, numerous dense spikes of small pure-white flowers: exceedingly bright and cheerful, especially as the hot weather approaches, when the foliage assumes an autumnred tinge; grown in the border it is rather troublesome, as it spreads over the ground very rapidly. The really ornamental species worth trying on the margins of ponds and streams at hill-stations are: *P. cuspidatum*, *P. filiforme variegatum* and *P. sachalinense*. Propagated by division and cuttings.

COCCOLOBA.

SEASIDE GRAPE.

C. macrophylla.—Is described by Curtis as—

"A noble, simple-stemmed, erect tree, with large leathery leaves, a foot or more long; tapers gracefully upward, is leafy all the way up, and terminates at the top by a dense compact thick club-shaped receme of flowers, of which the rachis, pedicles, and flowers are of the richest scarlet." *

A few plants are to be met with in the Calcutta Botanical Gardens.

C. platyclada.—A graceful bush when well grown. Remarkable for its phyllodonous leaves and berried fruit resembling small Grapes.

C. uvifera.—A fine species recently introduced from the West Indies.

ANTIGONON.

A. leptopus—Sandwich-Island Climber.—A lovely creeper easy to grow, affording ample large sprays of beautiful pink flowers and in blossom throughout the rains and cold season. A white flowering variety is now in cultivation. Propagated by seed, cuttings, and layers during the rains.

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* Botanical Magazine, 1, 4536.

A. insigne.—A recent introduction ; very similar to the last, except that it bears lighter coloured flowers and is of less extensive growth.

PHYTOLACCACEÆ.

LEDENBERGIA.

L. roseo-ænea.—This is a Central American shrub (climbing) with alternate petiolate entire leaves, large obovate-lanceolate, coppery-green above and bright rosy violet on the under-surface. Stems and branches reddish-purple. Thrives in a compost of rich loam, leaf mould and old manure in proportionate parts. Good drainage is also necessary. Propagated by cuttings during the rains.

RIVINA.

R. lævis.—A shrubby herb, semi-wild in Botanic Gardens. Covered at times with pretty red berries. Another species, *R. humulis.* is known in Europe as Bloodberry and the rouge plant.

CHENOPODIACEÆ.

ATRIPLEX.

A. nummularia, and a few other species, or varieties, of the Australian salt bush are cultivated for their silvery or frosted-like leaves. They make distinct foliage-bushes. Propagated from seeds and cuttings.

AMARANTACEÆ.

GOMPHRENA.

G. globosa—GLOBE AMARANTH—GOOL-MUKMUL.—One of the hardiest and most valuable annuals of our Indian gardens, which it enlivens with a perpetual profusion of its ball-formed purple, red, orange and white blossoms throughout the rainy season. Sow the seed in June in all districts. A "hen and chicken" variety is sometimes met with.

AMARANTUS.

A. tricolor.—An annual remarkable for some of its leaves being blotched with red and others of them wholly of that colour. Sow the seeds in July on the plains and in June on the hills. A single patch of two or three plants is pretty enough, but many of them present rather a weedy appearance.

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A. caudatus—LOVE-LIES-BLEEDING.—A well-known old annual of English gardens, with long, drooping or trailing tails (decumbent spikes) of crimson or yellow flowers. Sow with the first rains.

A. hypochondriacus—PRINCE'S FEATHER—The leaves and stems of this beautiful annual are entirely of rich crimson, as also the upright plume-like flowers. Sow as in the above.

A. salicifolius.—A graceful variety three feet or more in height. In the form of a plume, with long, narrow, weeping leaves shaded bright orange-red. Other effective varieties are *melancholicus ruber*, *atropurpureum nanus*, *speciosus-aureus*, and *henderii*.

CELOSIA.

C. cristata—COCKSCOMB—MOORGHA—GOOL-KESH.—Many varieties of this fine annual are met with in India, where the climate suits them to perfection in the Deccan and Mysore. Monstrous heads of flowers of vraious shades of orange, yellow and crimson are usually seen at flower shows. For pot-culture seedlings should be frequently transplanted in a rich compost, and be finally grown, to blossom in a rather poor sandy soil. Sow from June to November at intervals of a month.

IRESINE.

I. herbestii.—A fine-foliaged herb valued for bedding out as a distinct contrast to other plants. Soft-wooded, and easily raised from cuttings. The whole plant varies in beautiful shading from dark maroon to bright carmine and deep crimson. Flowers unimportant, and should be nipped off. Very hardy.

I. acuminata.—Of the same nature and colour. Leaves somewhat large acuminate.

I. lindenii.—More erect in habit. Leaves narrow lanceolate. This is the darkest variety. Very effective in ribbon borders.

I. aureo-reticulata.—A small pretty variety, the green leaves being veined red and netted with gold. There is also a variegated variety of I. herbestii. All are desirable plants.

ALTERNANTHERA.

A Brazilian genus of dwarf, herbaceous plants, noted for the pretty tints of colouring in the leaves; including various shadings of orange, red, pink and yellow; and much used in Indian gardens as neat edgings to flower beds and small foot-paths. They are also indispensable in designs for carpet-bedding. Quite hardy; but much attacked during the early monsoon by grub. Easily propagated by division. The varieties found in gardens are *amabile*, *amœna*, *spathulata versicolor* and *tricolor*.

CSL

ÆRUA.

A native genus of woolly herbs or small undershrubs. Of little importance for the garden *Ærua javanica* and one or two other species are suitable for the rockery where the long dense spikes of white to rose-coloured flowers are effective.

ACHYRANTHES.

A. alopecuroides.—Probably a form of *A. aspera.* A small herbaceous plant, with foxtail-like spikes of small, closely packed, milk-white flowers. Effective in a bouquet. Raised from seed.

DEERINGIA.

D. celosioides.—A subscandent shrub cultivated occasionally for its globular scarlet berries. Only fit for the shrubbery.

NYCTAGINEÆ.

BOUGAINVILLEA.

This important genus of South American climbers is well established in Indian gardens, where all the known species seem to thrive admirably.

B. spectabilis.—A large, rampant, thorny shrub of climbing habit. Requires, if not allowed to climb a large tree, a powerful frame-work for its support. But a tree affords the most natural support. Isolated on an extensive lawn it becomes, with a little training, a huge bush. Only ornamental when covered with its rosy-mauve to pale crimson bracts, which are produced in great profusion, with the small yellow flowers, during the months of February and March ; affording a perfect blaze of colour. Propagated by seeds and layers. *Syn. Josepha Augusta.*

B. lateritia.—This very popular variety or species bears a profusion of brick-red bracts veined and tinged with scarlet. The foregoing species produces its flowers and bracts only once a year, but lateritia blooms at least three times, if not more, within the same period. Propagate from seed.

B. glabra.—A smooth-leaved species. Bracts of a brilliant mauve colour, and produced on three or more occasions during the year. Easily raised from seed and layers. The other varieties in local cultivation are *speciosa, fulgens* and *splendens.* All are propagated by layers and a few by seeds. When properly trained, the Bougainvillea makes a serviceable hedge or fence which is not easily penetrated.

PISONIA.

P. alba—LETTUCE TREE.—A small tree or large shrub of beach forests on the Andaman Islands. Requires sea-air and succeeds well on both the east and west coasts of tropical India. The dense foliage of the tree, resembling a Lettuce in colour, has a very refreshing appearance in such places. Good specimens are seen in Madras. The climate of Calcutta seems too cold for it to acquire the verdant condition essential to its beauty. About Bombay it is often grown in tubs, but during the cold months under the shelter of the verandah. Propagated by seed and cuttings.

MIRABILIS.

M. Jalapa—MARVEL OF PERU—FOUR O'CLOCK PLANT.—A tuberous-rooted, large and very common plant found in gardens in all parts of India; constantly in blossom with numerous Ipomæa-like flowers of moderate size, white, orange, scarlet, and crimson colours prevail, while many are striped and spotted with mixed colours. The plant seeds freely and is usually self-sown. Tubers can be wintered in the manner of Dahlias.

M. longiflora—SWEET-SCENTED MARVEL OF PERU.—Described as bearing white flowers with a tube four or five inches long, and emitting a powerful fragrance like that of the Orange blossom and Heliotrope combined. Dr. Voigt states that it was in the Calcutta Botanical Gardens seven years wihout blossoming.

M. multiflora.—This pretty species, bearing numerous flowers of a bright purple colour, is best adapted for cultivation on the hills. All are hardy and make attractive border plants three to four feet in height.

ABRONIA.

A. umbellata—SAND VERBENA.—A very beautiful trailing annual: bears globular heads of lilac, fragrant flowers, in character much resembling those of a Vervena. The seed should be sown in October on the plains and in March on the hills, and the plants will be in full blossom in February and June respectively; and will die off on the first approach of the hot weather on the plains. The young seedlings require great attention, as being of a succulent nature they are very apt to damp off, as well as to be devoured by birds. They require light sandy soil and are best planted in wide pans about eight inches deep. *A. arenaria* produces yellow honey-scented flowers, *fragrans*, white, and *pulchella*, pretty pink flowers.

PLANTAGINEÆ.

PLANTAGO.

P. Brasiliensis.—A small herb rarely found in Botanical Gardens, but of little horticultural interest. *P. major*, a medicinal herb, is indigenous to the country.

LIBIATEÆ.

OCIMUM.

Toolsee.

Weedy-looking herbaceous plants, with little to commend them to a palce in the garden except the agreeable and peculiar fragrance of their leaves ; raised from seed, which they produce in abundance.

O. sanctum.—A small plant with leaves and stem of a dull red purple, and small purplish flowers ; common all over India, and well known for the sanctity in which it is held by the Hindus ; very apt to become a troublesome weed in gardens where it has once established itself, shedding its seed abroad, and producing young plants in profusion, which the mâlees are very reluctant to destroy.

O. basilicum, var. *glabratum—Basil—Goolal Toolsee.*—Pleasing for the freshness of its rather large spear-formed, bright-green fragrant leaves.

O. viride—has recently been introduced from West Africa, where it is known as the "mosquito plant."

MELISSA.

M. officinalis—BALM.—This agreeable pot-herb succeeds well in the cooler parts of India. Raised from seed.

ORTHOSIPHON.

O. incurvus.—A small herbaceous plant, delicately beautiful when in full blossom in the hot season ; flowers small, pink, borne very numerously in long spikes. Propagated from cuttings or by seeds.

O. stamineus.—A very interesting and pretty little herbaceous plant ; blossoms in June, with lavender-coloured flowers, curious for their long projecting white stamens. Raised easily from seed.

PLECTRANTHUS.

P. aromaticus—BREAD-BUTTER PLANT.—A low growing wide spreading herb ; bears small, pink, insignificant flowers ; interesting only for its solid succulent leaves, which possess a pleasant aromatic fragrance. Every slip will readily strike.

PERILLA.

P. Nankinensis—bears insignificant flowers, but is much used as a bedding plant for its bronzy-purple leaves, curled and fimbriated at the margin. Makes a fine contrast with golden feather (Pyrethrum), and other distinct tints of foliage. It is a soft wooded annual raised from seed. Syn. *P. ocimoides crispa.*

GSL

COLEUS.

A genus of plants remarkable for the exceeding beauty of their leaves. For decorative purposes—especially for growing in mass in large beds—they are unequalled. The forms of leaves are much the same in outline, but varied in being fringed, saw-edged, and fimbriated ; while the variation and blending of colours baffles description. Over a hundred varieties are in cultivation, raised by hybridization. One way to get up a good collection is to obtain seeds from a reliable English seedsman. When once raised, plants can be propagated with the greatest ease by cuttings put down in sand during the rains. Many fine varieties are now in cultivation in India, and rooted cuttings are easily obtainable. A light rich soil suits them best. To form fine bushy plants, the branches should be pinched in when young. They are benefited by being well pruned during the winter, when they require shelter in Upper India.

On the hills they are best grown under glass, or shelter of some sort. During the winter they require a stove shelter. Cuttings can be put down at any time from May to September in sand, with bottom heat.

Coleus, especially in pots, gets "played out" after a time. It is better to propagate freshly by cuttings before this occurs, and throw away the old plant. The very quick growth of the cuttings renders it possible to lose practically no time. The plants will not tolerate strong direct sunlight all day long, nor violent or continuous wind, and are therefore suitable for corners where there is shade for part of the day. Against the walls of bungalows, if protected as above, they show to perfection. A great deal of artistic spirit can be exercised in the colour distribution of a group of these plants.

ANISOCHILUS.

A. carnosus.—A rather pretty herbaceous pot-plant ; bears in September small lavender flowers on club-like heads. Propagated by cuttings during the rains.

LAVANDULA.

L. spica—LAVENDER.—This delightful shrub is easily raised from seed in October, and may be preserved for years, and grown to a considerable size. On the Nilghiris plants of comparatively small size produce flowers abundantly.

POGOSTEMON.

P. patchouli—*Pucha-pat.*—A coarse-looking, low, herbaceous plant, of no interest whatever in the garden, but for the peculiar strong fragrance of its leaves, which are sometimes gathered and laid in a chest with linen to impart to it a fine scent. Propagated easily by cuttings or slips.

COLEBROOKIA.

Large uninteresting shrubs, with coarse sage-like leaves ; bear spikes of small insignificant flowers in March, but hardly deserve the room they occupy in a garden. *C. oppositifolia.*—Flowers pale chocolate. *C. ternifolia.*—Flowers pale green.

MENTHA.

M. auricularia.—A small herbaceous plant ; very pretty when in blossom in November, with small lavender flowers, on dense spikes, three or four inches long, and as thick as a man's little finger. Propagated by slips or cuttings.

SALVIA.

Of the several handsome species of this genus, few, it has been found, can endure the climate of the plains.

S. splendens.—A rather large herbaceous plant, superb when in full blossom ; the large gaping flowers, together with their large bracts, being of a brilliant scarlet. Some care must be bestowed to keep it in a healthy and thriving condition, otherwise it looks unsightly, notwithstanding its handsome flowers. It soon becomes old and worn and must be frequently renewed from cuttings or seeds.

S. angustifolia.—An herbaceous plant with long slender prostrate stems, and of very untidy habit ; flowers small, pretty, of a bright pure blue, produced in the cold season ; does not thrive well unless transplanted occasionally, which is best done in October. Propagated by cuttings or seeds.

S. cacaliæfolia.—A tuberous-rooted herbaceous plant ; bears very large exceedingly beautiful flowers of the purest azure-blue ; thrives well and is a common plant at Ootacamund, but is rarely to be met with on the plains, the climate of which it cannot long endure. Propagated by cuttings or seeds.

S. coccinea.—A small herbaceous plant, nearly always in blossom, with long erect spikes of small crimson-scarlet flowers, rather pretty, but not very showy. Raised easily either from slips or from seed.

S. farinacea.—A herbaceous perennial. Flower a curious mixture of white, violet, and pale blue. Very hardy.

S. patens.—Bears lovely deep-blue flowers. A very distinct and beautiful biennial. Sow in October on the plains and in March or April on the hills.

S. rubescens.—Annual. Producing spikes of dark-reddish purple flowers, the lower lip being white.

S. argentea.—Silver. Flowers pinkish-white. A biennial herb often seen in hill gardens.

CSL

S. fulgens.—Perennial herb with bright scarlet flowers.

A pure white unidentified Salvia is reported from Belgaum.

Salvias are most effective when massed together, either as pot plants or in the ground.

DRACOCEPHALUM.

Herbaceous plants, remarkable principally for the aromatic fragrance of their leaves.

D. canariense—BALM-OF-GILEAD—and *D. Japonicum.*—They are best treated as annuals, as they cannot be kept through the hot and rainy seasons without more care bestowed on them than they deserve. Sow the seed in October with the annuals.

D. moldaviaca.—An unpretending annual bearing small blue and white flowers. To be at all effective the plants must be grown in thick patches. Sow in October on the plains and in March on the hills.

PHLOMIS.

P. leonurus—JERUSALEM SAGE.—A coarse-looking, bushy plant about three feet high, rather gaudy when in full bloom in the cold season, with its succession of large bright orange flowers produced in crowded whorls along the stem. Propagated readily from cuttings in November.

GOMPHOSTEMMA.

G. melissæfolium.—A small herbaceous plant; bears in September whorls of largish orange-coloured flowers; a coarse-looking thing at best, much resembling a Dead-nettle.

STACHYS.

S. lanata.—A white densely woolly herb, suitable for the cooler parts of the country; and popularly used both as an edging plant and for carpet bedding. Propagated by offsets.

VERBENACEÆ.

ALOYSIA.

A. citriodora—LEMON-SCENTED VERBENA.—Well known for the fine fragrance of its leaves; a very common plant in the gardens about Calcutta; bears, principally at the beginning and end of the cold season, long, pretty, graceful spikes of very small milk-white, fragrant flowers. At Ootacamund it grows to become an immense shrub, six or eight feet high, with stems thicker than a man's arm, and remains constantly covered with a profusion of blossoms; plants, however, on the plains soon become decrepit and unsightly and are rarely found more than two feet high before they die off. It is best to, therefore, renew plants by laying down slips or cuttings in the cold weather. These should be put in a flower pot filled with silver sand, and kept in a shady place till they strike, which they do very readily. The young plants should then be potted singly, and by the rains they will become large and handsome.

VERBENA.

Many of the species, hybrids, and varieties of this beautiful genus may be met with from time to time in Calcutta gardens, but no dependence can be put upon their being found there permanently, as they are very apt, under any treatment whatever, to die off towards the end of the rains. The losses, however, may be repaired by repeated sowings. If a packet of choice seeds be procured from England and sown in October, a good supply of plants of several varieties may be raised, which will come into blossom in March ; and little difficulty will be found in keeping these till the following cold season, during which they will blossom beautifully. Some two or three of the commoner kinds it may perhaps be found not necessary to multiply in this way, as they are of a robust nature, and young plants propagated from layers will survive the hot and rainy seasons. From their trailing habit when put out in the border, Verbenas have usually an untidy appearance. Small circular or oval beds, each filled with a distinct variety, have a most charming and glowing effect during the very long time the plants last in the full height of their bloom.

The variety known as "scarlet" is a perennial in this country, and one of the most brilliant in colour. Easily propagated by layers and cuttings in the cold months.

The Verbena loves a soil well enriched with vegetable mould but is impatient of wet. The beds in which it is planted should be slightly raised, so as to form low mounds. The tendency of the stems to throw out roots, wherever they rest upon the earth, sufficiently indicates that it requires frequent renewal of soil. The finer kinds never, according to Firminger, produce seed here.

Though a perennial, the Verbena should be treated as an annual in this country, except, perhaps, at a few of the coldest stations. Under such treatment it not only blooms more freely during the cold season, but it also escapes, to some extent, the ravages of its natural enemies—mildew, green fly and dampness. To induce early flowering, the Verbena should be twice transplanted into pans or boxes of rich soil during the seedling stage of growth. The final planting into well-drained beds or borders should take place when the sturdy-looking plants are half-a-foot or more in height. They are always very susceptible to damp and should not be carelessly watered overhead. The leggy or scraggy appearance they often present in gardens may be attributed to this favourite practice of the mâlees. The Verbena has been brought to great perfection by crossing, and specially assorted strains of seed, as obtained from Europe, contain very beautiful varieties under quite a number of fancy names. Of those *Crimson King, Boule de Neige, Lustrous, Nemesis, Auriculæflora, New Mammoth* and *Carnation Striped*, are favourites.

V. venosa.—Readily known by its long, spear-formed leaves, bears dull-lavender flowers ; a very robust but not an attractive plant.

V. bonariensis.—A coarse-looking plant of upright growth about three feet high ; gears large clusters of very small uninteresting lavender flowers.

STACHYTARPHETA.

The following are raised from seed :—

S. mutabilis'—A large shrubby, herbaceous, rather coarse plant, with rough wooly leaves ; flowers small, Verbena-like, bright-red, borne upon spikes, sometimes two or three feet long ; nearly always in bloom.

S. jamaicencis.—An herbaceous plant with smooth, pale-green leaves ; produce long spikes of small blue flowers ; common, and of little merit. A domesticated weed.

S. orubica.—An herbaceous plant, distinguished from the last by its leaves, being strongly veined and much crimped, and its flowers of a violet colour.

GMELINA.

G. hystrix.—A climber introduced from the Philippine Islands. Pretty when covered with its orange-yellow flower, the tube of which is curiously inflated.

G. asiatica.—Indigenous, subscandent and very hardy. Similar to the above, but better adapted for making a nice fence on poor land.

LANTANA.

A genus of very beautiful flowering plants, remarkable for the strong sage-like scent of their leaves ; nearly always in blossom during the warmer months ; very rapid in their growth, and requiring repeatedly to be cut in, to keep them within bounds ; easily propagated by cuttings or by seed, which they all bear freely.

L. trifolia.—A small common, somewhat coarse-looking plant but notwithstanding, rather pretty blossoms with heads of levender-coloured flowers, succeeded by berries of the same colour, bright like enamel, and as ornamental as the flowers.

CSL

L. selloviana.—A small trailing plant, having altogether the habit and appearance of a Verbena, except for the bright little blue berries it bears, and the scent of its leaves ; flowers pale purple.

L. camara—WILD SAGE.—A large bushy shrub, six to ten feet high ; most rapid in its growth, with dark green foliage of oval-notched, rough, powerfully-scented leaves ; a common plant, often found growing wild, nevertheless exceedingly beautiful when in full blossom, as it nearly always is, with its numerous small, semi-spherical compact corymbs of orange and yellow flowers, succeeded by bunches of purplish-black fruits. There are a great many varieties, named according to the colour of the flowers they bear. "Le Bon Jardinier" gives the names of as many as eighteen, of which some half dozen, perhaps, are now cultivated here. Forms a fair fence, but becomes a pest very quickly.

L. nivea.—In habit and foliage similar to the last ; flowers white, tinged with lavender with yellow centre ; exceedingly delicate and beautiful.

There are many French hybrids also in cultivation, which are best raised from seed annually.

CITHAREXYLUM.

C. subserratum—FIDDLE WOOD.—A small tree ; bears during the rains, long drooping spikes of numerous small, milk-white, very fragrant flowers. Propagated by cuttings in the rains.

CLERODENDRON.

A genus that comprises some of the most beautiful plants with which our gardens are adorned. Nothing can possibly surpass the loveliness of some of the species, particularly the seven first described below. The several species do not appear as yet to have been well determined. "Whoever" says Dr. Lindley, "shall investigate the true distinctions between the beautiful species of Clerodendron with scarlet inflorescence, will find as ample a harvest of confusion to be reaped as he can desire." *

Some occasionally yield seed, and all may be propagated without difficulty by cuttings put down in the rains or from offsets or suckers which most species send up abundantly. Sir J. Paxton observes : "Flowers are produced from the top of the current season's shoots ; therefore cut away wood of the previous season to within two or three buds of the base."

C. Kæmpferi.—A shrub about three feet high ; flowers borne in April, of a coral-crimson colour, in a large close mass, surmounting the head, of dark handsome leaves in a very stately way. Sir J. Paxton says this is probably identical with *C. fulgens*. It, as well as

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* Edward's "Botanical Register" for 1844, f. 19.

C. pyramidale, is most easily propagated by cuttings of the young shoots, which soon become handsome plants.

C. urticæfolium.—A plant of lower growth than the preceding, but very similar in the manner of flowering. Its deep rich green leaves set off admirably the exquisite crimson-scarlet heads of flowers which rise above them in September.

C. pyramidale.—A shrub three or four feet high ; bears during the rains, it flowers in enormous, dense, conical heads, presenting a truly magnificent appearance, though their colour is perhaps somewhat inferior to that of other kinds, being of rather a pallid crimson, not so brilliant as in either of the two preceding.

C. hastatum.—A tall-growing shrub, native of Sylhet ; remarkable for its handsome spear-head-like leaves ; flowers described as more than five inches long, greenish-white, with the mouth of the throat marked with fine purple dots, borne in April and May.

C. splendens.—A dwarf climber, native of Sierra Leone ; blossoms in large close clusters of gorgeous crimson flowers ; of exquisite beauty when in fine condition, as sometimes seen in the stoves in England. In the vicinity of Calcutta it can hardly be kept alive, and flowers, but very indifferently, in January.

C. squamatum.—The stems of this shrub rise naked from the ground about three feet, and then bear a parasol-like expansion of handsome, rich green, heart-shaped leaves, surmounting which rise the heads of blossom, resembling a mass of bright crimson coral. When in full flower, in April and May, no plant can surpass this in beauty.

C. fallax.—A shrub about three feet high ; produces in March pale violet-coloured flowers in large semi-spherical heads upon slender stems.

C. fragrans.—A vigorous, low-growing, large-leaved plant ; flowers very double, like little roses, white tinged with pink, of exquisitely delicate fragrance, borne in large compact heads during all the hot and rainy seasons ; the leaves have a most disagreeable fetid smell ; a very troublesome plant in the border on account of its throwing up suckers to a considerable distance around.

C. infortunatum.—A common roadside weed, very pretty, however, in February and March, when bearing its large heads of pinkish-white flowers.

C. nutans.—A tall shrub, about eight feet high ; blossoms in November with an immense profusion of large white-tubular, hanging flowers, presenting a most lovely appearance.

C. siphonanthus.—A small shrub, native of India ; blossoms in May, with a great profusion of white tubular flowers, three or four inches long, when the plant, with its long strap-like leaves, has a very chaste, handsome appearance.

GSL

C. odoratum.—A shrub of considerable size and spreading habit, requiring to be well cut in to be kept within bounds ; produces, in February and March, an unlimited profusion of pretty pale-blue sweet-scented flowers. There is a variety that produces white flowers.

C. phlomoides.—A shrub of some size, produces numerous small creamy-white flowers, very sweet-scented, particularly at night ; a common jungle plant, hardly deserving admittance into the garden.

C. serratum.—A large-leaved, coarse, unattractive shrub nearly always in blossom ; flowers dull light-blue, not large nor interesting.

C. Thomsoni.—A most beautiful climbing plant, of recent introduction, bearing during the rains, in great profusion, large corymbs of flowers, with white calyx, and corolla with purple tube and deep-crimson limb ; succeeded by purple berries of the size of a Pea, very ornamental with the white persistent calyx. Most easily propagated by cuttings in sand during the rains.

C. speciosum and *C. Balfourianum* are recent introductions.

C. interme.—A subscandent shrubby species, common throughout the Deccan (Vishmadhari gida in Kanarese), makes a good hedge.

DURANTA.

D. plumieri.—A rather large woody, thorny but handsome spreading shrub, native of the West Indies, about six feet or more high, with bright-green foliage. Constantly in blossom with numerous drooping bunches of bright azure-blue flowers, succeeded by pretty orange-coloured berries of the size of a Pea ; a common plant found in most Indian garden. From its neat foliage and thorny nature it forms a very pretty garden hedge. Raised easily from seed or by cuttings in the rains.

D. plumieri alba.—Differs in no very marked degree from the last, except that its flowers are white and its leaves somewhat smaller. Raised from seed or cuttings in the rains. Forms a good hedge.

PETRAEA

P. Volubilis.—A scandent or twining shrub, native of South America ; requires a stout framework of bamboo for its support ; bears bright, pure azure-blue, star-like flowers, in large, elegant, wreath-like clusters ; when in full blossom in October, and more especially in February, one of the loveliest objects in nature the eye could rest upon. It may be also trained as a standard. Propagated by layers, or from rooted suckers, which it not unfrequently sends up.

P. erecta.—Except in its more upright habit of growth, the difference between this and the last is not very marked. The bracts are shorter, and more resemble the lower petals of the flower, the leaves are smaller, and the plumes of blossom perhaps not so handsome. Propagated like the foregoing. Possibly a variety of the first named.

CALLICARPA

Not very ornamental plants ; bear large bunches of small, uninteresting flowers, succeeded by numerous shot-like berries in October. Propagated by seed or cuttings in the cold months.

C. cana.—Has large coarse wooly leaves, with berries of a milk-white colour. *C. lanceolaria.* Rather large coarse leaves and bears ; pale lilac flowers. *C. purpurea.*—A neat shrub with small leaves ; bears numerous pretty levender berries.

C. lanata.—A small tree of the Western Ghauts, is occasionally found in gardens ; appreciated for its Elder-like umbels of pretty reddish-purple flowers.

CONGEA.

C. azurea.—Native of Martaban ; an exceedingly extensive climbing shrub, sometimes covering entirely the summit of a large tree, and when in blossom in January, and seen from a distance, has a very splendid effect, presenting a large uninterrupted expanse of pale dull-red blossoms somewhat resembling in form those of Petræa. Propagated by cuttings put down in November.

In addition to the plants described above, the order *Verbenaceæ* affords such noble trees as *Tectona grandis*—the teak—*Premna tomentosa. Gmelina arborea* ; aslo *Vitex altissima* and *V. Negundo*.

ACANTHACEÆ.

In plants of this order our Indian gardens are rather rich. They are for the most part easy of culture, and are propagated readily from cuttings during the rains. All require very much the same mode of treatment ; that is to say, frequent renewal, transplantation to fresh soil every year or so, and close cutting in when the flowering season is over ; otherwise they soon come to look unsightly.

In Vol. I, New Series, of the "Journal of the Agri-Horticultural Society," is a descriptive and classified list of all the plants of this order cultivated in the Botanical Gardens by Dr. T. Anderson, at the conclusion of which are following valuable remarks extracted by Firminger :

"Until recently all the Acanthaceæ have been cultivated in the open ground, generally in the flower borders of the garden, where the soil is kept open. Under this treatment many of the species grow vigorously, and afford in their season of bloom some of the gayest ornaments of the Indian flower garden ; but there are many other lovely species, and specially those which inhabit the cool mountain forest of the Himalayas, the Khássia Hills, Ceylon and Java with some delicate

American species which have been kept alive with difficulty. The dry atmosphere and scorching sun prevailing during March, April and May are most pernicious to these plants, and excepting perhaps moisture stagnant about their roots, are the worst conditions in which they could be placed. Shade-loving species of Acanthaceæ have, however, lately been removed to a cool house, like those adopted here for the cultivation of Orchids and Ferns. In such structures these delicate Acanthaceæ have grown with a surprising vigour, and have become a mass of beautiful luxuriant foliage, and many of them have already blossomed as freely as in their native forests.

"Some of the Ruellias and the allied genera Stephanophysum and Stemonacanthus, nearly all the Strobilanthi, some of the Dædalacanthi, all the Alphelandreas, Crytantheras, Beloperones, the American Justicias, several of the Eranthemas, and five species of Thyrsacanthus thrive under shelter; while exposed in open borders some of them barely exist and scarcely ever flower."

THUNBERGIA.

T. fragrans.—An herbacious climbing plant, with slender stems and rough small, heart-shaped leaves; bears nearly always beautiful snow-white flowers of the size of a rupee; very ornamental, grown in a pot. Propagated from seed which it bears in abundance. Contrary to what the name would seem to denote, the flowers have no fragrance whatever.

T. grandiflora.—A most extensive climbing shrub, with heart-formed leaves; grows to the summit of the loftiest trees, covering them with a curtain of foliage so dense as, when seen from a distance, to present the appearance of some ivy-clad ruin. It may, however, by training and close pruning, be made to blossom beautifully of a small size: bears very large, pale-blue, widely expanded flowers at all seasons, but principally in the cold weather. Propagated by layers and cuttings.

T. laurifolia.—A large climbing shrub, native of Burma; bears flowers hardly to be recognized from those of the preceding, but quite different foliage, the leaves being of a long, lanceolate, tapering form, nine inches long: when trained over a wall or trellis, the profusion of large flowers, two and-a-half inches across, of the palest lavender colour, which it bears makes it a truly delightful object during the cold season. Yields seed abundantly.

T. alata.—A small annual twiner with softly villous stem and leaves. Semi-wild in gardens and found in several varieties. Bears round, flat flowers of moderate size, and of a great variety of shades of colour, white, yellow, buff, and orange, with and without a dark purple eye. The varieties alba—white—and *aurantiaca*—deep yellow—are the best defined. Sow seed all the year round, or when procurable. If not gathered in time, the seed capsules will open and spill the seed. Well suited for rockeries and small trellis work.

T. grandiflora alba, with pure white flowers, has recently been introduced.

THUNBERGIA Syn. HEXACENTRIS.

T. coccinea.—An extensively-climbing shrub; ornamental if kept within bounds; has curious parallel-nerved, narrow, heart-shaped leaves, about four inches long: bears moderate-sized flowers of singular form, and of yellow and dull-orange red colour in the cold season. Propagated by layers and cuttings in the cold months.

T. mysorensis.—A climber with long pedicelled, drooping, ample racemes of most beautiful flowers; combining various shades of orange, yellow, red and purple and appearing in the distance like some rare orchid. Usually shy of seeding and has to be propagated mostly by layering. Known in Mysore as the Munzerabad creeper being the name of the district where it is most abundant.

MEYENIA.

M. Hawtayneana.—A neat, pretty, climbing plant with slender thread-like stems, and very rigid heart-shaped leaves, an inch and-a-half long; bears, at nearly all seasons, large azure-blue flowers, with a white tube; a native of the Nilgherries, and rather delicate in the plains, where it is very apt to die off; succeeds better in the open ground than in a pot, and should be planted in a shady spot; seeds abundantly in the cold weather, from which plants can be easily raised. *Syn. Thunbergia Hawtayneana.*

There is likewise a white variety.

M. erecta.—A dwarf, woody shrub, two or three feet high, smooth, myrtle-like, oval leaves, the stems and young shoots of a deep purple colour; bears principally in the cold season large beautiful, Gloxinia-like, deep-blue flowers, with pale-yellow tube. This charming plant, introduced from Kew in 1859, thrives here so well and is so easily propagated, that it has now become one of the commonest ornaments of the Calcutta gardens. Trimmed specimens will be seen in the Lal Bagh, at Bangalore, as also a hedge, for which the shrub is well adapted. There is a variety with white flowers, but the blue is much the handsomer. Propagated by cuttings in the rains; produces abundance of seed in the cold season.

HENFREYA.

H. scandens.—A shrub of moderate size, native of Sierra Leone, with smooth lanceolate leaves five inches long; bears in March large, white, handsome, thimble-formed flowers. Propagated by cuttings in the rains. *Syn. Asystasia scandens.*

DIPTERACANTHUS.

D. ciliatus.—An exceedingly charming small prostrate-growing shrub, with oval, pointed, hoary leaves, two inches long; blossoms in September with beautiful, large, thimble-formed, pure azure-blue flowers with a white tube. Propagated by cuttings in the rains. *Syn. Ruellia ciliatiflora.*

PETALIDIUM.

P. barleriodes.—A very pretty small shrub with round smooth leaves ; bears in February and March a profusion of bunches of large, white, thimble-formed flowers. Propagated by cuttings in the rains.

JACOBINIA.

J. Gheisbreghtiana.—A small decorative shrub with scarlet flowers in terminal panicles. A desirable plant under partial shade, where it flowers freely for several weeks. *J. coccinea* and *J. Lindeni,* scarlet, and orange-flowered respectively, are perhaps best known in this country under the old name of *Justicia.* They need the same culture as plants of the latter genus.

STEPHANOPHYSUM, Syn. RUELLIA.

S. repens.—A small herbaceous plant ; bears nearly always heads of vivid scarlet flowers, an inch and-a-half long, of a horn-like form with gaping mouth, sparkling and pretty.

S. Baikiel.—A remarkably beautiful plant, about two feet high, with wavy, oblong, pointed leaves ; bears in the cold season heads of numerous large, tubular, heath-like, deep-crimson red flowers, about two inches long. A profuse bloomer.

S. longifolium.—Is a recent introduction. Both propagated by cuttings in the rains. Now included under the genus Ruellia.

STROBILANTHES.

S. Dyerianus.—An exceedingly pretty foliage plant recently introduced to cultivation. As growth progresses, the leaf exhibits most beautiful tints of silvery to reddish purple, shaded with bronze and green. The flowers are pale purple. An effective plant. Propagated by layers and cuttings. *S. glandulosus* is also a recent introduction.

S. scaber.—An exceedingly pretty small shrub when, in March, it bears in great profusion its clusters of small thimble-formed, sulphur coloured flowers. This and the following can be easily increased by cutting in the rains.

S. auriculata.—A small plant of rather coarse appearance, but very handsome while bearing its numerous heads of pale lilac thimble-formed flowers in the cold season.

S. sabiniana.—A small shrub, two feet high, remarkable for its large deep-green, pointed-oval, saw-edged leaves, from two to four inches long, with their under-surface of a purplish-red colour; bears large lilac flowers in the cold season.

S. maculata, olim *Ruellia*.—A small herbaceous plant; when in vigour very ornamental for the double row of blotches of silvery film upon each of its large, smooth, glossy, deep-green, lanceolate leaves, three or four inches long. Dr. Anderson remarks: "The silvery-white spots on the leaves, so beautifully marked in its native forests, are seldom well developed in Calcutta."

S. tomentosa.—A small, not very ornamental, plant, with densely woolly stem and leaves.

S. sessilis—Native of Bombay; described by Curtis as bearing large handsome blue-rimmed flowers with lilac tube.

CHAMERANTHEMUM.

C. Beyrichii variegatum.—Introduced from Brazil. A small shrub with pretty variegated leaves in the style of Eranthenium. Thrives best in a rich light soil composed of loam, leaf-mould and a little sand. Propagated by cuttings during the rains. Needs a glass-house on the hills.

GOLDFUSSIA.

G. colorata.—A handsome small shrub, three feet high, with oval, taper-pointed, saw-edged, deep-green leaves, which, while it is in blossom, from December to March, contrast well with its sprays of gay crimson bell-like flowers.

G. isophylla.—A very cheerful and delightful little bushy plant, about two feet high, with dark Willow-like leaves; blossoms in the shade in the cold season, with an unlimited profusion of pale-blue flowers, like those of a Harebell Campanula.

G. anisophylla.—Differs imperceptibly from the preceding, except in having its pairs of leaves of unequal size and its flowers a little larger.

G. glomerata.—A dwarf rather prostrate shrub, with hoary green leaves, which contrast finely with the beautiful large, deep azure-blue flowers, with swollen white tubes, that it bears in the cold season.

G. lamiifolia.—A very pretty small slender trailing plant; bears in the cold season, numerous little pale-lilac thimble-formed flowers.

G. devaricata.—Dr. Anderson describes as a large shrubby species from the temperate forests of Nepal, bearing large snowy-white flowers with a dark brown spot on the inside of the tube of the corolla; plants die after ripening their seed.

G. rubescens.—Dr. Anderson says: "A native of the sub-temperate forests of Sikkim; a beautiful species, producing a profusion of large blue flowers once only in its lifetime."

All the above can be propagated by seed sown in October, also by cuttings in sand put down in November, on the plains.

DÆDALACANTHUS.

D. splendens.—Dr. Anderson says: "A very handsome species." The segments of the corolla change to a dark cinnabar colour on the opening of the flower. Propagated by seed and cuttings in October and November on the plains.

ASYSTASIA.

A. formosa.—A truly lovely small herbaceous plant, produces large handsome, bright-scarlet, tubular blossoms in constant succession all the year round nearly, rather delicate, should be grown in a pot and kept somewhat in the shade.

A. coromandeliana.—A trailing plant of weedy and untidy habit, grows in the shade, and overruns the ground in a very short time; bears numerous pretty thimble-formed pale-purple flowers with light straw-coloured tube.

A. Africana.—Flowers almost pure white, produced nearly throughout the year.

All the above can be raised by seed in October on the plains.

LIBONIA.

L. floribunda.—An attractive flowering shrub, three to five feet, succeeds well at hill stations where it possesses the merit of being nearly always in flower. The latter is profusely borne, drooping in habit, tubular in form, and scarlet, with yellow tips. Easily propagated by layers and cuttings.

L. Penrhosiensis.—This is a cross obtained between the foregoing species and Jacobinia Ghiesbreghtiana and is described as an exceedingly decorative and useful shrub. It should be tried on the hills.

BARLERIA.

B. buxifolia.—A dwarf, woody, prickly, weedy, kind of plant it bears in the cold season small, white, bell-formed flowers of little interest.

B. ciliata.—A very ornamental bushy shrub, about three feet high; blossoms in the cold season with numerous rather large, bright, pale-blue flowers.

B. cristata.—A handsome bushy shrub, three feet high, bears in September and October a profusion of fine azure-blue flowers.

B. dichotoma.—Exactly like the preceding, except that it bears white flowers in September.

B. Gibsoni.—A bushy shrub, about three feet high with smooth pointed, lanceolate leaves, four inches long, by far the most showy of all the Barlerias, and a splendid ornament in the cold season, when it puts forth its constant succession of bright azure-blue flowers, three or four times larger than those of any other species.

B. lupulina.—A small thorny plant, with the long, narrow, glossy leaves prettily marked with their red midrib ; bears small straw-coloured flowers on great chocolate-brown wheat-ear-like heads ; curious, but not very ornamental.

B. rosea.—A small shrub, very beautiful in the cold season when bearing its profusion of rose-coloured blossoms.

B. prionitis.—A small thorny shrub, about two feet high, a common weed of this country, bears pale nankeen flowers, which have a pretty appearance upon the deep-green verdant leaves when the plant is in good condition.

B. cærulea.—A small not very pleasing plant, bears azure-blue and rather pretty flowers, but on great ugly heads of compressed bracts.

B. hirsuta.—An agreeable shrub when in blossom, with its bright azure-blue flowers.

B. montana.—A pretty plant, with deep-green leaves shot with purple ; flowers pale rose-colour.

All the above can be propagated by cuttings in October and November on the plains.

GEISSOMERIA.

G. aurantiaca.—A very handsome shrub, three feet high, with large, thick, glossy laurel-like leaves ; bears in February and March blossom-heads of bright vermilion tubular flowers an inch long, requires to be kept in a shady situation, or the leaves lose their fine verdant appearance. Propagated by cuttings put down in October and November on the plains.

G. coccinea and *G. longiflora* are recently introduced, species, of which the last named is a particularly fine shrub, flowering at intervals all the year round.

FITTONIA.

F. gigantea ; *F. Verschaffeltii* ; *F. V. argyroneura* ; *F. V. Pearcei.*—Lovely little plants with variegated leaves, natives of the shady forests of Peru. Under the name of Fittonia are given several species of low trailing habit, ornamental for the pink or white veins of their leaves. Admirably suited for covering rockeries and for hanging baskets. They propagate themselves by the trailing branches taking root wherever they touch. Old mortar or concrete suits them best, in which they thrive to great perfection. They are at their best during the rains.

ACANTHUS.

A. ilicifolius—HURKUT.—A shrub, about three feet high, curious for the perfect resemblance its prickly leaves bear to those of the Holly ; produces in April and May large sky-blue flowers, somewhat like those of the blue Iris ; may be seen growing wild in wet ditches about Howrah. If grown in a pot, the latter should be kept submerged in water, as then the plants thrive best. Propagated by division and seed.

CROSSANDRA.

C. infundibuliformis.—A small shrub, two or three feet high, with lanceolate, taper-pointed leaves, three or four inches long ; bears largish orange-yellow flowers, upon wheat-ear-like heads, in uninterrupted succession from March to November.

There is a variety with orange-scarlet coloured flowers. Propagated by seed and cuttings in the rains.

APHELANDRA.

A. cristata.—A noble-looking shrub, three feet high, with lanceolate, taper-pointed leaves, seven or eight inches long, bears in March on the summits of the stems, crowds of quadrangular spikes of brilliant-scarlet flowers.

A. fulgens.—In general character not very dissimilar to the last, but has smaller leaves ; blossoms in the cold season, and produces much larger flowers.

A. tetragona.—A plant of extraordinary beauty when in full blossom ; bears densely-set vermilion-coloured flowers along the edges of the long cube-formed ears. Of dwarf habit, with rich foliage of lanceolate, taper-pointed, wavy leaves.

All the above are propagated by cuttings in the rains.

PHLOGACANTHUS.

P. thyrsiflorus.—A large shrub, from six to ten feet high, with handsome, laurel-like. very verdant leaves ; bears in January and February in great profusion, long crowded spikes of large, tawny-brown flowers ; such commended for its beauty by Roxburgh. Propagated by cuttings in the rains.

GRAPTOPHYLLUM.

G. hortense—CARICATURE PLANT.—A shrub of three to five feet, compact ; leaves rather large, elliptical, variegated green and white. Formerly called *Justicia picta*. Valued for its prettily marked leaves, the crimson flowers being of little importance. There is a variety with purplish leaves and carmine veins. Both shrubs are useful for

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massing, and for planting in the back rows of a ribbon border. Very hardy and easily raised from cuttings.

CYRTANTHERA.

C. Pohliana.—A small plant with pointed oval leaves three inches long; bears in the cold season crowded heads of rose-coloured, long, tubular flowers, ending in long gaping lobes with long projecting stamens; rather pretty.

C. aurantiaca.—Flowers Aphelandra-like, large, handsome orange. Propagated by cuttings in the rains.

ADHATODA.

A. cydoniæfolia.—A most beautiful shrub, native of Brazil; bears in the axils of the leaves large flowers, with the upper lip white, spotted with purple at the top; the lower deep-purple with a yellow ray down the middle. *A. œnea* is a recent introduction. Propagated by cuttings in the rains.

MACKAYA.

M. Bella.—This is a most desirable shrub, native of South Africa, where it forms one of the handsomest objects in the South African landscape. The flowers, from four to six inches long, borne on pendent racemes, are of a lovely pale lilac. When in bloom the plant is one lovely mass of lilac. Thrives fairly well in the grass conservatory, in a rather gravelly soil mixed with leaf-mould and sand. Propagated by cuttings and layers during the rains.

BELOPERONE.

B. oblongata.—A handsome small plant, nearly always in blossom, with large purplish-crimson flowers.

B. nervosa.—Of larger habit than the last, with larger leaves, flowers pink.

B. verrucosa.—A small plant, with pink flowers not unlike those of a dead-nettle. All the foregoing propagated by cuttings in the rains.

B. chrysophlœa.—A beautiful shrub having golden leaves. Produces heads of purple flowers during the hot and rainy months in the north, and at intervals all the year round in the south. Succeeds well in the grass conservatory, where it requires good drainage and plenty of water. Propagated by layers and cuttings.

B. violacea.—A somewhat smaller species with violet-coloured flowers. Nearly allied to *Justicia* and requiring the same culture.

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ERANTHEMUM.

E. bicolor.—A small plant, very beautiful when in full blossom, as it nearly always is, except in the cold season, with its rather small, pure white flowers, with a dark-puce spot on the under lip.

E. crenulatum.—A small shrub, bears in the cold season pure white flowers, prettily pencilled with puce-coloured markings.

E. erectum.—A plant, about three feet high, with small narrow leaves ; bears in the cold season flowers of a most beautiful blue with dark eye.

E. nervosum, syn. *Dædalacanthus.*—A large bush, with large blackish-green leaves ; of extraordinary beauty when in full bloom in February, with its profusion of deep azure-blue flowers on large prettily-pencilled ears. *Var. E. pulchellum.*—Bears flowers in March, similar, but of a paler blue.

E. strictum.—Bears flowers much like those of *E. erectum,* but with a light eye, and has much larger leaves.

E. grandifolium.—A plant of straggling habit with pale-blue flowers.

E. racemosum.—A small under-shrub of great beauty, native of Moluccas, with oblong leaves ; bears in November large pretty flowers, pale, pink, or white, tinged with red.

E. Blumei.

E. cinnabarinum.—From the Tenasserim forests ; bears large conspicuous flowers.

E. igneum.—Lately introduced.

The following are the more recent introductions, and are all remarkable both for the beauty of their leaves as well as their flowers :—

E. albo-marginata, the leaves being margined with white ; *E. argenteum,* the leaves of a silvery hue. *E. Cooperii ; E. Eldorado ; E. macrophylla variegata,* with noble-looking variegated leaves. *E. moorei ; E. nigrescens ; E. nobillis; E. roseum; E. salicifolium,* with drooping, Willow-like leaves ; and *E. tricolor.*

The above are all easily propagated by cuttings in sand during the rains ; also by division in many cases.

JUSTICIA.

A genus of plants very closely allied to Eranthemum, from which it is difficult to distinguish them.

J. betonica.—A small herbaceous plant, remarkable principally for the beautiful pencilling of the ears on which the flowers are borne.

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J. calycotricha, syn. *Thyrsacanthus*.—A small, delicate plant, very pretty when in bloom in the cold season, with its close heads of pale-lemon flowers.

J. carnea.—A very choice and handsome plant, two or three feet high ; bears in the cold season large, gaping, rose-coloured flowers in great clustered heads.

J. coccinea, syn. *Thyrsacanthus*.—A shrub, three or four feet high, with large handsome oval leaves, as much as ten inches long, of a dark bright green, relieving beautifully the brilliant, crimson-scarlet, tubular flowers, two inches long, borne on densely crowded spikes. In a good soil apt to be troublesome from the numerous suckers it throws up around.

J. Gendarussa.—Bears flowers of moderate size, dirty-white, and of little beauty. A useful edging plant.

J. grandifolia.—A handsome foliaged plant with delicate flowers ; from the Tenasserim forests.

J. rutilans, syn. *Thyrsacanthus*.—Flowers scarlet.

J. argentea ; *J. mannorata* ; and *J. zebrina* are recent introductions.

PERISTROPHE.

P. tinctoria.—A pretty, simple little plant, two feet high ; bears in the cold season unpretending flowers, consisting merely of two pale-pink, narrow, strap-like lobes.

P. speciosa.—Very similar to the foregoing, except that the flowers are a little larger. Roxburgh says of it: "A native of Bengal, where it blossoms in the cold season, and is one of the greatest ornaments of the forests."

P. augustifolia aureo-variegata.—One of the prettiest forms of the genus. All are propagated by cuttings during the rains.

SANCHEZIA.

S. nobilis.—An evergreen shrub introduced from Ecuador, and cultivated in shady parts of the gardens. The oblong glaucous-green leaves are nearly a foot in length under good cultivation ; flower yellow in dense terminal panicles, rather coarse but lasting a long time ; enclosed between reddish bracts.

S. n. glaucophylla.—In this variety the midrib and lateral veins of the leaf are beautifully banded with yellow and white. Propagated by cuttings during the rains.

PEDALINEÆ.

MARTYNIA.

M. diandra.—THE DEVIL'S CLAW.—A native of Mexico, but naturalized in this country ; bears in great profusion very large, handsome, gape-mouthed, rose-coloured flowers, of a heavy, rather disagreeable odour ; grows to between three or four feet high, and forms quite a little bush, with large coarse leaves, of such rampant growth as hardly to be admissible in a garden but of large extent. The seeds are sown in July on the plains, and in May on the hills, and the plants continue in blossom during the rains. The seed-pods, when fully ripe and dry, are very curious, being about the size of an Almond, black, with two long horns proceeding from one end of so hard, horny a nature that the seeds can only be removed with great difficulty ; it is best, therefore, to sow the seed-pod entire, and separate the young seedlings afterwards.

M. fragrans.—Bears flowers very similar to those of the preceding, and of the same rank, unpleasant odour, but is a plant of much smaller habit, with much smaller foliage. Sir J. Paxton gives some very particular directions for the cultivation of this annual in England,* but here nothing more is required than to sow the seed in well-enriched soil in October on the plains, and in April on the hills, and about seven weeks after the young plants will come into flower, and continue blossoming and growing till about two feet high.

M. lutea.—A plant in every respect similar to the last, except in bearing pale yellow flowers.

It may be noted here that on the hills it is useless to cultivate these plants unless under glazed shelter.

SESAMUM.

S. indicum—TIL.—A native of this country, and grown in great quantities for the sake of the seed, from which an oil is extracted ; but still a pretty annual, bearing large, tubular, white and rose-coloured flowers, and well deserving a place in the gardens. Sow the seeds in July. It is not worth a place in hill gardens, where space is limited.

BIGNONIACEÆ.

CRESCENTIA.

C. Cujete—CALABASH-TREE.—A tree-shrub : flowers large, bell-shaped, greenish-white, with dull-purple lines borne on old thick parts of the tree. Principally interesting for the pumpkin-like gourd it bears, of which domestic vessels are made in Jamaica. Propagated by seed in the rains.

C. acuminata.—A curious evergreen shrub, interesting from the character of its stems, which bear wings, rendering them of the same

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*"Magazine of Botany," Vol. I, p. 118.

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broad flat appearance as the leaves. Propagated by seed and cuttings in the rains. Other species in cultivation are *obovata cucurbitina.*

KIGELIA.

K. pinnata.—A large coarse-looking tree, unfit for the garden. Remarkable for the curious way in which the bunches of dull, liver-coloured flowers dangle from different parts of it at the end of their rope-like flowering stems, six feet in length. These are succeeded by enormous sausage-like pods, sometimes in bunches of two or three together. Propagated by seed in the rains.

BIGNONIA.

The species of Bignonia, natives of this country, are nearly all trees of large size, producing great dull red yellow, unpleasantly smelling flowers. Those most deserving a place in the garden have been introduced into India, and are plants of scandent habit; these, when in full bloom, are truly charming objects. They are benefited by being well pruned in after they have done flowering. All are exceedingly easy of propagation, either by layers or cuttings, which strike freely.

B. Chamberlaynei, syn. *equinoctialis.*—A most extensively spreading shrub: covers a large space of trellis or wall in a very short time, and requires to be often pruned in to keep it within bounds; throws out slender green stems to a great length, along which it bears pairs of pinnate leaves. Each leaf consists of two oval, pointed, wavy, smooth, shining leaflets, two inches long. From the axils of the leaves are borne primrose-coloured, thimble-formed flowers, with the tube two inches long, produced in great profusion nearly at all times, contrasting beautifully with the richly verdant and graceful foliage.

B. Crucigeria.—A climbing shrub of the habit of the preceding and bearing, in the hot season, flowers similar in form and size, of a dull tawny-yellow colour; not a common plant, nor a very attractive one.

B. Unguis-cati—(Sometimes called *B. gracilis*).—An extensively-climbing shrub, with rich varnished-green, pinnate leaves of two leaflets, broadly oval, pointed, two inches long; bears, during the hot months, a vast profusion of flowers, in form and colour similar to those of an Allamanda, with a tube two inches long, expanding at the mouth into five lobes, three inches across. During the time that it is in blossom a plant of extraordinary beauty. Flowers 2—3 times yearly. This plant will, like Ivy, cover stone walls without any artificial support. It does not, however, climb by means of roots, as Ivy does, but hangs on to the stone by one of the leaflets of each leaf modified into a claw.

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B. incarnata.—A climbing woody shrub, with smooth, rather leathery lanceolate leaves, three to four inches long, bears flowers similar to the last in size and form, of pale lilac colour, striped with deep purple; produced in great profusion in the hot months, and presenting a remarkably handsome effect upon the Bay-leaf-like foliage.

B. venusta, syn. *Chirere.*—A climbing shrub spreading over a vast space where room is afforded it. The foliage consists of pairs of pinnate leaves along the stem, of two heart-shaped, pointed, dull-green leaflets, three inches long. From the axil of each leaf is borne a crowded drooping corymb of tubular vermilion-coloured flowers, two inches long; blooming in January and February in such exuberant profusion as to cover the entire suarface of the plant with a carpet of colour. Probably no plant in the world presents a more truly gorgeous appearance than it does then.

B. undulata.—Is described as a tree with drooping branchlets like those of the Weeping-willow. and bearing in March small recemes of very large, erect, inodorous, orange-coloured flowers. "When in flower," Dr. Roxburgh says. "one of the most beautiful small trees I have seen."

B. quadrilocularis.—A large tree; blossoms at the beginning of the hot season, with large erect panicles of many-flowered, large, rose-coloured, delightfully fragrant flowers.

B. amœna.—A small, handsome tree; with cheerful foliage of narrowly-lanceolate dark-green leaves, two inches long; produces in the hot season numerous funnel-shaped, large yellow flowers, with mouth expanding into five orange-coloured lobes.

B. picta and *B. Roezleana* are of late introduction.

B. magnifica.—Native of the United States of Columbia, and recently introduced, with handsome leaves, marked somewhat like Cissus discolour, and bearing very large flowers, of a delicate mauve at opening, but which change to rich crimson, with a throat of a light primrose colour; perhaps the loveliest Bignonia in cultivation. It is a very prolific bloomer.

B. grandiflora and *B. radicans* bear dull red flowers very similar to each other.

B. aurantiaca bears large orange-red flowers. An extensive climber.

B. excelsa and *B. ornata* are recent introductions. So is *B. voilacea* which bears lovely violet-coloured flowers.

B. megapotamica—Rio Grande Trumpet Flower.—An extremely pretty evergreen tree recently introduced from Brazil.

With branches gracefully sweeping the ground, glistening olive-green leaves, and light-purple flowers; this is as good a subject for the lawn or for a small avenue as could well be found. Propagated by seed.

MILLINGTONIA.

INDIAN CORK TREE.

M. hortensis.—A lofty tree, with exceedingly beautiful foliage of deep-green decompound leaves, looking remarkably handsome in the cold season, when in blossom, with its numberless panicles of large, pure white, fragrant flowers. Not suitable for avenues as it is tall rather than spreading, and tends to lose its leaves in the hot weather. It tends, moreover, to become top-heavy, and as its root system is not large or deep, may fall during a heavy storm. It is graceful as an occasional plant or in small clumps. Propagated by seed in February. Suckers are produced in troublesome profusion.

AMPHILOPHIUM.

A. Mutisii.—A climbing shrub of most extensive growth, making its way to the summit of the loftiest trees. Far from being an ornamental plant, except for the flowers it occasionally produces in October, which are large, of a fine purple colour, and, from the manner in which they are borne, somewhat resemble great clusters of Grapes.

SPATHODEA.

S. uncinata.—An extensively-spreading climbing shrub, with very slender stems and dense foliage of opposite pinnate leaves; leaflets narrowly heart-shaped, an inch long; bears in the hot season numerous pale livid-red flowers. neither large nor very interesting. Propagated by cuttings in the rains.

S. serrulata.—A high tree, bears in May, in great profusion, drooping creamy-white flowers of extinguisher form, seven inches long. Propagated by cuttings in the rains.

S. campanulata.—A noble tree, introduced from tropical Africa. For scenic planting in extensive grounds this is one of the finest subjects in the country. Deciduous for a few weeks in the drier parts of India during the hot season, after which it breaks into leaf and is subsequently covered for a long period (September and October). or two long periods if the season is favourable, by a gorgeous display of large, well-shaped, orange-crimson flowers. The buds of the latter are popularly used by the native boys as water-squirts. Propagated from seed and root-cuttings.

TECOMA.

T. grandiflora.—A handsome climbing shrub, with graceful spray-like foliage of bipinnate leaves; leaflets seven, roundish, saw-edged, about three-quarters of an inch long. Trained up a high pole, surmounted by two short cross-beams in the manner of a turn-stile, it will let fall its great drooping clusters of large orange-coloured flowers in a very beautiful way during the hot months. It sheds its leaves in the cold season, when it should be well cut in, and the numerous suckers it sends up all around be removed, and some enriched soil be given to the roots. The suckers will afford a supply of fresh young plants. It bears seed abundantly in November.

T. radicans.—A small shrub, 3—4 feet high, of graceful foliage, similar to that of the last, but of smaller size and more dense and verdant ; of spreading habit, emitting roots from its branches wherever they touch the ground ; constantly in blossom with a profusion of drooping corymbs of orange-scarlet, tubular flowers an inch and-a-quarter long. Propagated by cuttings in November.

T. Jasminioides.—A scandent shrub, with bright, dark-green pinnate foliage ; leaflets 5—7, smooth, shining, narrowly oval, pointed ; certainly one of the most beautiful plants of the garden ; continually in blossom with corymbs of large, rosy-white, much expanded flowers, with dark purple centre. Propagated readily by cuttings in the rainy season.

T. stans.—A small tree, 8—12 feet high, of graceful foliage. Leaves pinnate, leaflets from 7—11, three or four inches long, much slashed, and notched ; when in full blossom, as it often is, a most beautiful plant. Flower moderately large, funnel-shaped, with widely expanded mouth, in clusters, and golden-yellow. It is killed by the cold season in Upper India, but seeds sown there in March produce plants which blossom beautifully in October of the following year. It has run wild in the Deccan.

T. Australis.—A large woody climber with clustered masses of heavily-scented flowers of a tawny-yellow colour more or less spotted with purple. *T. A. La Trobi* is a smaller plant of the same habit. Flowers smaller and paler in colour. Introduced from Australia. Raised from seed and cuttings.

T. velutina and *T. undulata* are improvements on *T. stans*, but more shrubby in growth. Flowers brilliant golden-yellow.

T. capensis.—This is a well-known plant-house climber from the Cape. Flowers orange-scarlet.

T. dentata is a new variety from Australia.

ECCREMOCARPUS.

E. scaber.—A beautiful slender, climbing shrub, bears middling-sized, tubular, pale-red flowers, grows freely at Ootacamund ; but Firminger never saw it on the plains. Firminger many times sowed the seed, but it never germinated. *E. elongiflorus*, a species with yellow and green flowers, would also succeed at hill-stations.

PARMENTIERA.

P. cerifera—THE CANDLE-TREE.—This tree, introduced from the Isthmus of Panama, with its pretty white (or slightly rosy) flowers and quaint fruit deserves a place in the compound. Easily raised from seed.

Other desirable trees of the family, which should find a place in the arboretum, are *Stereospermum chelonoides*—PADRI-TREE—the deliciously-scented flowers of which are so much prized by the Hindus. *S. xylocarpum*, with beautiful white flowers and a monstrous-looking capsule (fruit) known as the "buffalo horn." *Oroxylum indicum* is remarkable both for the large size of its compound leaves and the dark purple, nearly black colour of its flowers.

CAPSIDIUM.

C. chilense.—A fine climber with dark-green foliage and tubular orange-coloured flowers.

Another species *C. filcifolium*, with Fern-like foliage, is said to do well at Calcutta, where it succeeds in the grass conservatory planted in a light rich vegetable soil. Propagated by layers during the rainy season. Rare in the country.

PHYLLARTHRON.

P. comorense.—This is a medium-sized shrub, native of Mauritius and Madagascar. Leaves narrow, from 1—2 inches long. Flowers pink, borne in cymes at the tips of the branches. It yields a peculiar white fruit, about the size and shape of the little finger, which is used in Mauritius for making jellies. Grown as an ornamental plant and thrives fairly well in the open. *P. Bojerina* is said to be the only species in European cultivation. Propagated from cuttings.

GESNERACEÆ.

GESNERA.

A very numerous genus of choice, small, herbaceous plants ; of exquisite beauty when blossoming in a thriving condition ; for the most part unsuited seemingly to the climate of the plains, though they do well enough in Calcutta gardens. Most of the varieties are tuberous-rooted, and can easily be increased by division of roots. Some of the succulent leaved varieties are easily increased by inserting a single leaf in silver sand under a hand-glass, during the rains.

G. Douglasii.—A very handsome species, with erect stem about ten inches high, upon the summit of which alone the foliage is borne ; leaves lanceolate, four inches long, woolly, of a soft, agreeable yellowish-green ; bears, between January and April, rather large tubular flowers of a vivid orange-red. It requires at all times the shelter of a verandah or conservatory. The soil in which it is grown should by no means be dense, or at all impervious to water. In the pot in which it is to be planted lay some large pieces of brick, over them a layer of coconut-fibre, and then fill the upper half with a light soil of leaf-mould, river-sand, and shreds of coconut-fibre, through which the water will drain down as soon as poured. Easily propagated by removal of the suckers it sends up.

G. tubiflora.—A native of Buenos Ayres, and a very common plant indeed about Calcutta. The stems lie prostrate upon the ground, bearing at their extremities whorls of woolly lanceolate leaves, five inches long; produces in April clusters of heavy, but not disagreeably-scented, large, palish primrose-coloured flowers, of tubular form, the tube three inches long, and then expanding so as somewhat to resemble a white Petunia. The root is tuberous, and might easily be mistaken for a large Potato; should be grown in a pot, but will bear exposure to the weather. Easily propagated by separation of the tubers in the cold season, but the plants do not blossom for some time if the roots are much disturbed. Dr. Lindley considered this more properly a Gloxinia than a Gesnera. (*See* "Botanical Register for 1845," p. 3).

G. leichtlina.—A very handsome plant; with large heart-shaped, dark-green leaves, rendered soft and woolly by the crimson pubescence with which they are covered, with their under-surface a deep crimson; in character much like those of some of the Begonias; throws up footstalks two feet high, bearing a spike of pretty pale vermilion flowers, opening in long succession. The tubers, much like those of an Achimenes, were sent me from England, and throve and blossomed well in my verandah at Gowhatti.

G. splendens.—The tuber of the size of a large Potato.

G. magnifica, purpurea.—These two Firminger received from England; they throve in his verandah, but did not blossom. *G. refulgens* is a beautiful-leaved variety.

Besides the foregoing, many other varieties are now cultivated with success in the grass conservatory. It should be borne in mind that the tuberous-rooted varieties die down in the winter, when water should be discontinued. They should be re-potted in March.

ACHIMENES.

A genus of herbaceous tuberous-rooted plants, producing during the rains a continued succession of large, most lovely flowers, in form something like those of the Petunia, but with a more flattened limb. The number of varieties is very great, nearly all of which may be easily procured from seedsmen in England. The plants are best kept under shelter from sun and rain. Their roots do not go deep into the earth, they therefore need only shallow pots or pans. If

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pots are used, half fill them with large pieces of brick, then put a layer of coconut-fibre, and fill up with leaf-mould rendered grey with silver-sand, and lightened with shreds of coconut-fibre. If pans are used, lay at the bottom of them a layer of coconut-fibre, and fill up with soil, the same as used with pots. The pans should then be let down in empty flower-pots, the rims of the former resting upon the rims of the latter, as represented by Fig. 19, page 82. By this means the plants will be raised up to view, and vermin will be prevented from creeping in through the hole at the bottom of the pans. When the tubers begin to start about March, put them in the soil an inch deep, not more than three at the most in each pan. After they have appeared above ground, water them constantly, or they will be liable to die down again. They remain in blossom, more or less, from June to October. In November cease to water them, and allow them to die down. They may then be left in their pots just as they are, and put away in some dry place till the time comes round again in March to re-pot them. Or the tubers may be taken up; but when this is done great caution must be used, and the soil be watered some hours beforehand to render it as loose as possible, as the tubers, from their scaly nature, are very brittle, and easily damaged. The several kinds may then be put away separately in jars or pots of sand till the season to re-pot them.

An interesting method of growing Achimenes is to put a tuber in a handful of leaf-mould, and bind moss round it with string, so as to form a ball of the size of a Pumelo. Lay it upon a flat earthen pan, with holes for drainage. Suspend the pan in the verandah, and keep the moss constantly damp. The Achimenes will thrust itself through the moss, and thrive and blossom, and form a very pretty ornament. *A. longiflora* and *A. alba* have been grown in this way.

Mr. Grote had in his garden at Alipore a small circular bed, under the shade of a tree, in the open ground, planted with Achimenes, which, he told Firminger, throve and flowered well there. The bed had a good foundation of kunkur for drainage. And Mr. S. Jennings at Allahabad says: "I know of nothing that equals Achimenes for the open border during the rains."

None of the varieties appear to bear having their shoots shortened; and if much damaged in this way by the wind or any other cause, they do not recover themselves so as to thrive so well afterwards. The tops of the shoots, planted in sand and well-watered, soon form vigorous young plants. Firminger tried to strike other portions of the shoots, but did not find any successful, except cuttings with a single joint. This kind of cutting with about an inch of stem left below the joint, so as to serve as a peg to secure it in its place, is let into the soil, so that the joint with its contiguous pair of eyes and leaves is half buried. This will soon form a rooted plant. A sprig also put into a phial of water soon forms roots. Except, however, in case of accidental breakage of a rare specimen

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propagation by cuttings is not worth while resorting to as the plant is so prolific in producing tubers.

The following Firminger had blossoming satisfactorily in his verandah ; they comprise none of the so-named Tydæa kinds, several of which he tried, but without success, as might have been expected, since they do not make scaly tubers, but only slender underground stems, nor suffer drying like Achimenes.

A. longiflora major.—Flowers large, of a clear, pale azure blue ; this is certainly about the most beautiful of all, as it is the commonest and most hardy. The plant is distinct from others in its tendency to throw up numerous suckers at a distance from the main stem.

A. longiflora alba.—A variety of the former and equally beautiful, with pure white flowers.

Mauve Queen, flowers very large, of a deep, pure azure blue with orange eye, somewhat similar to longiflora major ; but the plant is of a different habit, rather delicate, and not very free in blooming ; *Ambroise Verschaffelt,* flowers French-white, beautifully pencilled with violet ; a delightful plant and a profuse bloomer. *Dr. Buenzod, Carl Wolforth* and *Sarsoni* are ordinary kinds of different shades of purple ; *violacea semiplena,* a profuse bloomer, very handsome, with curious half-double purple flowers ; *grandiflora,* a very distinct plant, with large handsome leaves ; flowers of a delicate rose tint, with white eye ; the bulbs are as thick as a man's little finger, and as much as four inches long : *rosea elegans,* a slender plant, with very small leaves ; flowers small bright pink ; *meteor,* and *carminata splendens,* of different shades of crimson ; *vivicans,* flowers not large, of dazzling scarlet ; *scarlet perfection,* flowers carmine scarlet.

Amongst those mentioned as the most beautiful are, Aurora, described as very fine, with flowers two inches in diameter, deep heavy scarlet, with light yellow eye, besides—

Adonis, amabilis, elegans, Escheriana, Estella, gigantea, ignea, magnifica, Mazeppa Roezlia.

Besides the above, scores of others have been raised.

GLOXINIA.

Firminger remarks—"This, like the last, is a very numerous genus of tuberous-rooted herbaceous plants, some remarkable for the velvet-like lustre on their large oval leaves. They produce roundish bell-formed flowers of astonishing splendour during the rains. They are easily obtained from England, and sometimes blossom beautifully, but do not seem to last long in this country, owing perhaps to sufficient care not being bestowed upon them. The mode of cultivation suited to them is the same nearly as that given for Achimenes. Sir J. Paxton observes that 'the richest colours are usually produced in somewhat mellowed light, and that blossoms shaded by the leaves will be found of a richer tint than more exposed blossoms.' They require some situation under shelter from the sun and from the rain. They thrive vigorously and blossom well in grass conservatories. Mr. Coles Hardinge states that at Rangoon he hybridized the flowers of plants he had in bloom there, and was very successful in raising fresh plants with the seed he saved from them. He sowed the seed in well-drained pans, filled with a mixture of sand and sifted leaf-mould and covered with a piece of glass. They germinated in a week, and the seedlings were fit for pricking out singly into small pots in about a month; then they were covered with bell-glasses, till they had become strong and formed tubers. Mr. Coles Hardinge owed much of his success, I believe, to his seed having been fresh, as that which I have procured from England I have found to fail in germinating." Dr. J. Beaumont, of Indore, writes to the Agri-Horticultural Society:—

> I find Gloxinias do better if made to flower twice a year. I plant the bulbs in January; they flower in April, are dried in May, re-potted and watered as soon as they begin to sprout in July, and they flower again in August and September. Treated thus, the bulbs are finer, larger, and grow much stronger than if flowered only once; and there is the advantage of two crops of flowers.

Gloxinias cannot stand exposure to the rain, nor should the leaves be wetted when water is being applied to the roots. They also need perfect drainage, so that plenty of crocks should be placed in the bottom of each pot.

Rats and mice are exceedingly fond of the dried tubers and can quickly consume a whole collection.

There are numerous varieties of *Gloxinia*, some of which have erect and others drooping flowers. A great many of these new forms have been raised by crossing and selection from *G. speciosa*, the proper name of which is *Sinningia speciosa*. A packet of specially selected seed usually affords a great variety of flowers, and is preferable to replanting the same tubers from year to year. The names, with descriptions of fancy varieties, can be seen in the catalogues of European seedsmen.

G. maculata.—A very common plant in Calcutta and elsewhere, altogether distinct from any of the florists' kinds referred to above. Of large, strong-growing habit, handsome for its bright, glossy, succulent, heart-shaped leaves; bears in November, when it can be brought to blossom, which it is very shy of doing, large, pale-blue, tumid, bell-formed flowers. It should be potted in a light rich soil and be supplied with abundance of water during growth. The scaly tubers should be put away in their pots during the resting season, *e.g.*, from December to May.

ÆSCHYNANTHUS.

Plants of this genus are natives of humid forests, and several are found in Assam. As regards their leaves and manner of growth, they much resemble the Hoya, but produce very dissimilar flowers.

In their native localities they are epiphytal and in Europe are said to succeed best in reduced moss, with a little heathsoil and potsherds, as also to flourish most luxuriantly on a log of wood covered with moss, fastened with copper wire.

The above mode of culture points out the necessity of a light open soil of vegetable mould for their cultivation in this country. In the vicinity of Calcutta they thrive, generally speaking, but very indifferently, though plants of so much beauty as to deserve every attention bestowed upon them to make them thrive. Their cultivation in the conservatory is attended with marked success, though they flower but poorly there. Propagated by cuttings during the rains.

A. grandiflorus.—An indigenous, epiphytal, subscandent shrub. Bears in September heads of large trumpet-like flowers, of a beautiful crimson-scarlet colour with dark stripes.

A. miniatus.—Flower rich vermilion, tomentose, smaller than the last. Other species in cultivation are : *Roxburghii, Zebrinus, longiflorus, fulgens, splendidus, Lobbianus* and *speciosus*. All are propagated by division and should be treated like epiphytic Orchids.

KLUGIA.

K. Notoniana.—A native of Ceylon an abundant on the Nilgherries ; a small plant remarkable for the curious snail-like twist, its leaves, and the bright smalt-blue of its flowers. Blossoms in the rainy and cold seasons and loves a moist soil. Sow the seed in October on the plains and at any time on the hills. Keep in pots or pans of water after the seedlings are transplanted. Abundant on the Pulney hills.

TYDÆA.

This genus of American herbs is now practically absorbed in the next, which see.

T. amabilis.—A large herb—hairy all over—with long-pedunculate, solitary, dark rose-coloured flowers, proceeding from the axils of the upper leaves. Larger and coarser than Achimenes, to which it is closely allied and needs the same treatment.

ISOLOMA.

An American genus of herbs closely allied to *Achimenes Gesnera* and *Tydæa*. The species found in Indin gardens are :

I. pictum.—Flowers scarlet and yellow. Leaves rather large, ovate, acuminate, serrate hairy, reddish-purple on the undersurface.

I. Lindenianum.—A species having whitish flowers tinted violet and yellow. The olive-green leaves banded with silvery stripes. *I. Seemanni* and *I. houdense*.

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CENTROSSLENIA.

A genus of ornamental-leaved herbaceous plants of British Guiana and other parts of South America, one to two feet. Flowers tubular, spurred, usually whitish or shaded with other colours.

Requiring a shady situation, vegetable mould, and good drainage. The species in cultivation are *C. bractescens*; *C. picta*; *C. glabra*; *C. metallica*; *C. vittata* and *C. bullata.*

EPISCIA.

A genus of dwarf herbaceous plants, mostly from New Granada. Entered in the fourth edition under the genus Cyrtoderia. The following species thrive well in this country under the protection of a grass conservatory. A soil composed of leaf-mould, sand and garden loam, rendered loose and porous by pieces of old mortar or concrete, suits them best. The roots are fine and delicate, and when once planted cannot be disturbed without suffering serious injury. They do very well on rock-work and in hanging baskets. Propagated by offshoots, which the plants throw off largely, and also by inserting a leaf in fine sand under a hand-glass during the rains.

E. chentalensis.—Leaf heart-shaped, purple on the undersurface. Flower lilac with yellow centre and white tube. Large and pretty.

E. fulgida.—Leaf rather long, elliptic, crenulate, serrate. Flower bright red.

E. metallica—Not known.

E. villosa.—Said to be an effective species; not seen.

SAINTPAULIA.

S. ionantha.—A comparatively new genus of extremely pretty flowering herbs introduced from the Usumbara mountains in E. Africa. The type species has the habit and foliage of a small-leaved Gloxinia, and is equally impatient of rain on its leaves. Flower dark violet-blue with yellow anthers appearing above the leaves in the same manner as the violet.

S. I. albicans.—Is a new variety with white flowers. Good drainage, with protection from rain and high wind, is needed. Propagated from seed and by division of the side shoots.

DRYMONIA.

A genus of dwarf shrubs and climbers mostly South American. They prefer a moist situation and produce large, bell-shaped flowers like Gesneras. They delight in a rich, light soil. Cuttings strike readily in sand during the rains. There are several species in cultivation; but *D. marmorata, D. Turialvæ* and *D. bicolor* are the best.

STREPTOCARPUS.

S. Rexii.—An attractive perennial herb with the prostrate leaves of a primrose. Flowers one or two on a short scape, bluish. A good plant for the rockery. Several other species are worthy of cultivation in Indian gardens.

LENTIBULARIEÆ.

URTICULARIA.

U. reticulata and *flexuosa* are pretty weeds of swamps and paddy fields. Useful in the acquatic part of a rockery. These are mentioned not only that they are of botanical interest, but because we are sometimes blamed for not making sufficient use of strictly Indian flowers. Their botanical interest lies in the peculiar bladders produced on their submerged parts. Each bladder has a little door which opens inwards only. It is believed that these bladders are taps for small aquatic animals, which are caught and digested by the plant (*cf.* Nepenthes).

SCROPHULARINEÆ.

BROWALLIA.

B. elata.—A small annual of upright growth, comes into blossom seven or eight weeks from the time of sowing, and produces a profusion of small, bright-blue flowers, which last a very long time. To be effective the seedlings, whether in pots or the ground, should be planted thickly. Sow in October on the plains and at intervals all the year round on the hills. *B. elata grandiflora* is a large flowered pale-blue variety. Another variety of the same has pure white flowers.

MIMULUS.

M. luteus—Monkey flowers.—A decumbent or ascending herb, bearing large, handsome, gape-mouthed, yellow, crimson-spotted flowers, which are always much admired. Numerous crosses and hybrids have been produced, the flowers of which represent nearly every conceivable colour except blue.

M. cardinelis, with red flowers, is a hardy herb of two to three feet. *M. variegatus*, a Chilian species, and *M. guttatus*, from California, are the parents of numerous intermediate forms which produce flowers of exquisite beauty. Other well-marked varieties are *roseus capreus* and *duplex*, the latter having double or hose-in-hose flowers. The genus Mimulus should always find a place in the Indian garden. Although not strictly annuals, they should always be treated as such. The seed is very minute, and the best way to sow it is to mix it largely with very fine silver-sand, and then to lightly cast pinches of the mixture upon broad pans filled with finely sifted soil in which sand is an abundant ingredient. Except prior to sowing, the seed pans should not be watered from above, but be put, when the soil in them is becoming dry, into larger pans filled with water, until the whole earth has become moistened by the water passing through the holes below. Pick out the seedlings, when large enough, into single pots of small size. They are benefited by frequent re-potting. They require a rich soil with a good proportion of sand in it. The plants are all but aquatics, and do best with the pots in which they grow half submerged in pan-feeders of water. Sow the seed in October on the plains and in March on the hills. *M. moschatus*, the common musk, only succeeds on the hills in South India. At Ootacamund. it is said to be rather a nuisance.

The attempt to introduce into this country, on the plains, any of the beautiful plants of this genus, Firminger believed to be perfectly hopeless. Good thriving seedlings may be easily raised during the cold season, but will be sure to perish upon the first approach of the hot weather. Firminger noticed plants in the gardens at Ootacamund, but they seemed to thrive very indifferently even there. (General R. T. Baker remarks, "that they do well under shelter.") On the hills, in the Himalaya ranges, however, they are cultivated with great success. The seed should be sown in March on the hills, and the seedlings potted singly, shifting them into larger pots as they grow. Shade is undoubtedly necessary. In the herbaceous class the numerous fine hybrids of the day cannot be excelled.

CALCEOLARIA.

SLIPPERWORT.

Venus's Purse.—The flowers resemble circular purses, and have a very fine effect when properly grown. The seed should be sown in light soil, in October on the plains, and about the beginning of March on the hills. When the seedlings have formed the fourth leaf, they should be pricked off into pots where they are to remain, the soil being a light and rich one, with plenty of leaf-mould and sand. On the hills they come to great perfection without much trouble. On the plains they seldom grow to satisfaction. The common yellow variety, *C. pinnata*, thrives well enough, and is the one generally met with on the plains.

The Calceolaria has been the subject of much careful selection and hybridization in Europe, with the result that races of astonishing size and brilliant colours (*e.g.*, Sutton's "Perfection") are now available. Dwarf forms for bedding, and spray forms for table decoration, are also produced

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VERBASCUM.

MULLEIN

Erect, high-growing, coarse, weedy-looking plants, producing numerous yellow flowers of moderate size, of little ornament to the garden. Sow the seed in October on the plains, and in March on the hills.

V. thapsus has become domesticated at Nandidroog, where the native call it Kadu, Hogs soppu, or wild tobacco. It is also found wild at Wellington.

ALONSOA.

A. incisifolia—MASK-FLOWER.—A small, not very attractive plant, with ragged leaves ; produces small, vivid-scarlet flowers. Should be grown in large patches. Sow in October on the plains, and in March on the hills. Useful on the hills, where there are one or two species with pink and red flowers. *A. albiflora* has a white flower with yellow throat.

NEMESIA.

N. floribunda—A dwarf annual, bearing small flowers differing in no marked degree from those of Linaria. Sow in October on the plains, and in March on the hills.

CELSIA.

A genus of half hardy herbaceous plants after the style of Verbascum. Only suitable for the cooler parts of the country. Flowers yellow. *C. coromandeliana* is an indigenous shrubby annual of two to four feet. *C. orientalis* and *C. Arcturus* are worthy of trial on the hills.

LINARIA.

TOAD-FLAX.

Several species ; bearing pretty, unpretending, small frog-mouthed flowers in vast profusion. Sow in October on the plains, and in March on the hills. To be effective, several plants should be grown together in a group. Usually of trailing or creeping habit.

ANTIRRHINUM.

A. majus—SNAPDRAGON.—A perennial by nature, but usually cultivated as an annual in this country ; the seed is sown in October on the plains, and in March on the hills. They want a rich soil to grow them to perfection. The genus comprise a vast number of most beautiful varieties, produced by the art of the plant breeder. The

Tom Thumb varieties are dwarf strains bearing profusely through a long period. The tall varieties have a splendid effect in the garden and make excellent table decorations when cut. For long deep borders they are unrivalled. Self-sown at Coonoor and other hill stations.

COLLINSIA.

C. bicolor.—An annual of loose, untidy habit, about a foot and-a-half high, rather, pretty and effective in the border when in full blossom, with its profusion of blue and white flowers borne in a succession of whorls up the stem. Sow the seed in October on the plains, where it will be in flower by the end of January. On the hills the seed should be sown in March. *C. grandiflora* is a good variety, rose-pink.

CHAENOSTOMA.

C. polyanthum.—Bears small, insignificant pink flowers, scarcely worthy of a place in the garden. Sow the seed in October on the plains, and in March on the hills.

HERPESTIS.

H. monniera.—A pretty marsh weed of the country, suitable for the aquatic part of the rockery. Flowers white and blue. Self-sown.

PHYGELIUS.

P. capensis.—A showy glabrous shrub, three to four feet, introduced from South Africa. The drooping, tubular, scarlet flowers, with spreading lobes are very attractive at the ends of the polished-looking shoots. Best suited for sub-tropical India. Easily raised from seed.

SOPUBIA.

S. delphinifolia.—An indigenous erect herb with the linear or laciniated foliage of a Larkspur. Flowers well shaped, mauve or rose-coloured, pretty good for the rockery. There is a variety with pure white flowers. Will grow in ordinary soil from seed. It has recently been shown that this plant is a root-parasite, sending its sucker-roots into the roots of neighbouring plants. It prefers dampish soil.

BURNSFELSIA.

B. Americana.—An erect-growing shrub, six feet in height, with lanceolate, dull yellowish-green leaves; not ornamental, except in October and March, when in full blossom; flowers produced in great

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profusion, very large, in form, somewhat like those of a Petunia, pure-white, at first, becoming on the next day of a beautiful primrose colour ; yields seed in the cold season, somewhat resembling Holly berries, from which it may be propagated as well as from layers.

B. undulata.—A shrub of about the same size as the last, but of a more spreading habit, and with wavy leaves ; produces very similar flowers, and bears in March round seed-pods, like those of the Wood-apple, of the size of a small lime.

B. montana.—A small shrub, with long narrow, lanceolate leaves.

B. Cubensis.—A shrub with neat foliage of shining lanceolate leaves.

B. erecta.—All the above are easily increased by cuttings in the rains.

FRANCISCEA.

A genus of exceedingly ornamental flowering under-shrubs, natives of Peru and Brazil, where they are found growing in the shady parts of forests. A light pervious soil, containing a liberal supply of leaf-mould and some sand, suits them best. Propagated by layers.

F. latifolia.—A small, not uncommon shrub ; one of the most lovely plants our gardens contain ; has soft oval leaves of a most verdant refreshing green, which it sheds in the cold weather, but by the end of February puts forth again, producing at the same time numerous exquisitely fragrant flowers of flattened form, of about the size of a rupee, at first of a fine deep-blue, subsequently changing to pure-white ; blossoms also in July. It is usual to cultivate it in large pots, though it may be grown in the border.

F. eximia.—It is stated that "in Belgium this is spoken of as the finest species of the genus yet in cultivation." It is met with in Calcutta, but is not common ; a somewhat erect-growing shrub, three or four feet in height, with lanceolate leaves, tapering to a sharp point, from three to six inches long, of a dull opaque-green colour ; and with downy branches. Blossoms in February profusely, with flowers very similar to those of the last.

F. uniflora (F. Hopeana?).—Very similar to the two foregoing, but with smaller leaves ; flowers somewhat smaller, borne one on a footstalk, in February and March, presenting a perfect mass of lovely blossom, pure-white or deep-blue, according to the time they have opened, mingling together with delightful effect, and emitting a most agreeable perfume. Its main detraction is that it is rather bare of foliage at the time.

F. confertiflora.—A handsome shrub, with oval leaves, three or four inches long ; bears crowded cymes of beautiful lilac flowers; does well in the grass conservatories.

F. hydrangeæformis.—Remarkable for the largeness of its leaves, and its close heads of purple flowers ; has not been cultivated with success in the open, but does well in the grass conservatory.

F. Lindeni.—Is a recent introduction, and is rather uncommon. The genus *Franciscea* is now merged into that of *Brunfelsia.*

ANGELONIA.

A. grandiflora.—A small herbaceous plant, about two feet high ; bears nearly all the year long spikes of numerous small, blue, gaping flowers, with a strong disagreeable scent, which some, however, have considered to resemble that of the Pineapple ; plants require to be often renewed, or soon grow to look old and unsightly. Propagated by cuttings in the rains.

MAURANDYA.

M. Barclayana.—A lively creeping plant of slender habit and graceful foliage ; requires to be trained on a light trellis, and is best adapted for growing in pots to decorate the verandah ; flowers snapdragon-like of several varieties of colour—dark-purple, rose, and nearly white ; constantly in blossom. Seeds, sown as usual with the annuals in October, produce plants that blossom in three or four months' time. There are two or three other species of Maurandya, but none at all equal in merit to this. Self-sown on the hills.

LOPHOSPERMUM.

L. scandens.—A very handsome herbaceous creeper ; requires a large extent of trellis for its support ; flowers large, very similar to those of the Foxglove, but more delicate, of a beautiful rose-colour ; plants raised from seed in October, and kept through the hot weather till the next cold season, blossom in great beauty in February ; they require a great deal of pot-room, and a rich and well-watered soil. Sow the seed in March on the hills.

PENTSTEMON.

Herbaceous plants, about two feet high, producing erect spikes of pretty flowers of various colours, tubular or bell-formed, like those of Angelonia but larger, some, it is said, as large as those of Lophospermum ; plants raised from seed sown with the annuals in October will continue in blossom during the hot and rainy season following. May be propagated by division of the roots or by cuttings.

English seedsmen offer seeds of several species bearing scarlet, blue, yellow, and other coloured flowers ; but the largest and finest flowers are produced from hybrids with tradé names. A dwarf form is also available. Sow the seed in March on the hills.

VERONICA.

SPEEDWELL.

This large genus of mostly cold-temperate shrubs and herbs has a few representatives at hill stations, such as Darjeeling in the north and Ootacamund in the south. But it is useless attempting to grow them on the plains of Southern India *V. spicata* is a small shrubby species with terminal spikes of bright blue flowers. *V. Kirkii*, a fine white-flowered species from New Zealand, would be an acquisition to hill gardens.

TETRANEMA.

T. Mexicana.—A small pot-plant, half a foot high, in habit of growth somewhat resembling the Primrose; nearly perpetually in blossom, with crowded umbels of small, gaping, pale-lilac flowers; a perfect little gem, quite the ornament of the verandah, where it should be always kept under shelter from sun and rain; requires to be renewed every year; produces abundance of seed, which should be sown as soon as gathered, is as fine as dust, and takes a month or two in germinating. A pane of glass should be kept over the pot in which the seed is sown, to prevent the earth from drying too soon. The plants require a light vegetable soil, and perfect drainage.

PAULOWNIA.

P. imperialis.—An elegant deciduous tree, introduced from Japan. With dull-coloured-downy leaves and showy violet flowers this rare species deserves a place in the garden or compound. It flowers during the rainy season on the hills. Only suited to the cool parts of India. Propagated from seed.

RUSSELIA.

R. juncea.—A very common, but an exceedingly beautiful bushy plant, about three or four feet high; perpetually in full blossom, with tubular, bright scarlet flowers, half an inch long, borne in great profusion on its long rush-like stems. In England it is not unfrequently grown suspended in baskets, over which the drooping flower-loaded branches have a very delightful appearance. Plants, however, thus treated in this country would require constant attention that the soil be not allowed to dry up through want of watering. Every portion of it that touches the ground in the rains takes root. Firminger had in his garden several plants growing out of the crevices of a north wall which had rooted themselves there from a plant that happened to be leaning against it in the rainy season. These had very curious and interesting appearance.

R. floribunda.—A very handsome plant, bearing little similarity in general appearance to the preceding; flowers not large, crimson

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scarlet, borne in crowded bunches along and on the summit of the stem, in great profusion at all seasons. Propagated by division.

TORENIA.

T. Asiatica.—Called sometimes Sispara creeper, from being a native of that locality in the Nilgherries ; an extremely beautiful herbaceous pot-plant ; flowers small, bell-formed, pale purple, with a large blotch of dark clear purple on the lower lobe, sparkling like enamel ; best renewed annually from seed sown in March, both on the plains and on the hills. The plants thrive well in the shade, with their pots constantly immersed in pans of water, and blossom in great beauty in September. An albino form is known.

T. flava.—An annual spreading or decumbent herb suitable for small beds, baskets, and rock-work. Corolla a beautiful yellow with a purple spot in the throat.

T. Fordi.—An erect, compact-growing annual, suitable for bedding. Corolla limb, straw-coloured-lateral lobes blotched violet.

All the Torenias can be raised from seed and by division of runners and offsets. It may be mentioned as a point of botanical interest that Torenia has a sensitive stigma, which closes up at once when touched with a piece of grass. This is probably a device for holding pollen deposited on the stigma.

DIGITALIS.

FOXGLOVE.

The attempt to cultivate this well-known plant on the plains of India has never, Firminger states, proved successful. But on the hills they are found growing wild and need no care there. Sow the seed in March.

VANDELLIA.

V. pedunculata.—A somewhat rare annual having pale-blue flowers with a white spot. Not of much importance. Raised from seed.

SOLANACEÆ.

PETUNIA.

The Petunia has in recent years been hybridized and brought to such perfection that it is now classed as a Florist's flower. The double and fringed varieties are very lovely and in all shades of colour, from a light pink to a deep crimson and purple, with blotched, striped, and edged varieties.

While single Petunias are treated in this country as annuals, the double-flowered varieties are mostly grown on for two or more seasons, the superior kinds being reproduced by layers and cuttings. Petunias scent the garden pleasantly, especially in the evening after sunset. Water should not be dashed over the plants, nor will they stand much rain. The following are the two varieties commonly met with in Indian gardens :—

P. Nyctaginiflora.—With white, sweet-scented flowers, and

P. Phœnicea.—With bright crimson flowers, together with their numerous hybrids, producing flowers of every shade of colour intermediate between the two, and in particular of one with a green border, are, while in full beauty of bloom, about the most brilliant ornaments of the garden. Where it has been once grown, it thoroughly establishes itself, coming up self-sown on the approach of each cold season. These self-sown plants blossom in January, are rampant in their growth, and generally lose their hybrid peculiarities and resume their original type. It is best therefore to procure fresh seed from Europe annually. Sow in October in pans, and put out the plants when two or three inches high ; these will not come into blossom much before April, from which time too the rains they will afford a delightful display of flowers. The Petunia likes a rich soil. On the hills sow in March in pans under glass, in a frame if possible, and transplant only once. Water the soil frequently just before flowering.

HYOSCYAMUS.

H. niger.—HENBANE.—Bears large, bell-formed, buff-coloured flowers, prettily pencilled with purple ; an ornamental plant when in blossom, though rather unpleasant for its exceedingly rank smell. Sow in October on the plains, and in March on the hills.

NICANDRA.

N. physaloides—ALKEKENGI—KITE-FLOWER.—An annual of large weedy growth ; bears large, pale sky-blue flowers of a cupped form, the bottom of the cup being white, and dotted with five dark spots. Sow the seed in common garden soil in October on the plains, and in March on the hills.

NICOTIANA.

TOBACCO.

N. Tabacum.—Bears pretty delicately-pink flowers. This and other species of Tobacco, though not usually met with in Indian gardens, are by no means wanting in ornamental character, and a plant or two well deserve a place there. Dr. Anderson gives the names of as many as sixteen species cultivated in the Botanical

Gardens. Sow the seed in October. It is not worth cultivating in a garden on the hills, where space is limited.

The horticultural merits of this well-known genus have been much improved of late years, and several species should now find a place in the Indian garden. *N. acutiflora* is an elegant herb of two to three feet, producing pure white flowers of four inches in length. *N. affinis* and *N. fragrans* have pretty flowers, which send forth a delicious fragrance at night. *N. glauca* and *N. wigandioides* have yellow flowers, and are prized for their fine foliage : both are shrubs of considerable size.

DATURA.

THORN APPLE.

Dhootura.

D. fastuosa.—A common wayside wood, conspicuous for its large, handsome white flowers, but inadmissible into the garden. The seeds are poisonous.

D. fastuosa fl. pl.—Produces immense white blossoms, tinged with purple, remarkably handsome, and resembling in form three or four great extinguishers, projecting one a little out of the other. Sow the seed in July on the plains, and in June on the hills.

D. chlorantha fl. pl.—Produces great, handsome, sweet-scented, double, yellow flowers. The plants will live on after flowering till the following season ; but it is best to destroy them, as they take up much room and look unsightly, and to save the seed for sowing in July on the plains, and in June on the hills.

D. suaveolens.—A very large spreading shrub, with large thick flaccid leaves, makes a splendid appearance when in full blossom in the hot season, with its immense white, sweet-scented flowers, of the size and shape of a cow-horn, the corolla expanded at the mouth with frilled edges. It yields seed, but is easily propagated by cuttings in the rains. *Syn. Brugmansia suaveolens.*

D. sanguinea.—A shrub of much smaller growth than the last, and leaves of a darker green ; flowers also smaller and more tubular, with the rim curled over, of a dull deep-red colour ; thrives well at Ootacamund, whence Firminger brought down plants, both for the Calcutta Botanical Gardens and for his own garden ; but they all soon perished, seemingly unsuited to the climate of Calcutta. There is a variety with double flowers, *i.e.*, one tube coming out of another, and having a curious effect. *Syn. Brugmansia.*

SCHIZANTHUS.

This plant produces flowers which superficially are very unlike those of the Solanaceae, and have the effect of Orchids. There are

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many types now available, produced by the flourist's art. Some of these are *retusus* (in various colours), *Wisetonensis* (large flowers variously marked), *pinnatus* and *grandiflorus* (large-flowered). There are many beautiful hybrids advertised, some useful for decoration in pots, and others are cut flowers.

Sow in October on the plains and in March on the hills, in a light, rich sandy soil, where the plants are to remain, as they do not transplant well.

SALPIGLOSSIS.

S. sinuata.—A hardy annual, bearing pretty Petunia-like flowers, which last for some time. Height two feet. Leaves somewhat sticky. Flowers purple, yellow, or straw-coloured ; often beautifully striped or pencilled. There are many varieties, of which *coccinea* and *flava* are about the best. These plants do well in the north during the winter, and fairly well in the south during the months of July and August. Sow specially selected seed from Europe.

SOLANDRA.

S. grandiflora.—A shrub of considerable size, with very large, oval-lanceolate, smooth, pale green, rather wavy leaves ; bears in the cold season great, erect, cow-horn-shaped flowers with overlapping rim of a pure milk white, turning afterwards to a creamy-yellow, their five ribs beautifully washed within with purple faintly fragrant.

S. oppositifolia.—A shrub remarkable for its large yellow-green glossy leaves ; bears in May flowers very like those of the common roadside Datura.

Both of the above are easily propagated by cuttings in the rains.

SOLANUM.

Of the large number of species which this genus contains, not more than three or four perhaps are worthy of a place in the garden, or in fact are much better than mere weeds.

S. coriaceum.—A neat and ornamental small shrub, about two feet high, with lanceolate, smooth, leathery leaves, two and-a-half inches long ; bears numerous large, pale-purple flowers, succeeded in the cold season by dark purple, enamel-like berries of the size of a nutmeg. Propagated by cuttings.

S. amœnum.— A neat shrub, about four feet high, with polished leaves of a bright green, and bearing flowers of a rich purplish crimson. One of the best of these species. Propagated by cuttings.

S. argenteum.—A beautiful, small shrub, about three feet high, with Oleander-like leaves of silvery hue, borne on the summit of the stem ; bears during the hot season numerous thimble-formed,

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pendulous, pale, lilac flowers. It is best to grow it in a large pot for, if planted in the open ground, it becomes very troublesome on account of the numerous suckers it sends up for a great distance around.

S. macranthum.—A small, spreading tree, about 10—25 feet high, with very large leaves ; nearly always in blossom, and very showy, with its numerous immense Potato-like flowers, white on opening and turning purple. Propagated by seed. Syn. *S. Maronianse.*

S. Seaforthianum.—This useful creeper has recently made its appearance in Indian gardens in one or two varieties, of which one has clusters of pretty white flowers succeeded by the same of crimson berries.

S. Wendlandii.—The introduction of this fine plant from Costa Rica is of very recent date. It is undoubtedly the finest climbing Solanum in cultivation. Flowers very large, lilac blue, in pendulous cymes more than half a foot across. Propagated from seed.

CESTRUM, syn. HABROTHAMNUS.

C. fœtidissimum.—A pleasing shrub, about five or six feet high, but with leaves that have a detestable smell when bruished ; bears, at different seasons of the year, drooping fascicles of small tubular flowers, in size and form-resembling percussion caps, of a dingy lemon colour. It throws up an immense number of suckers, which require to be continually removed, as they produce no flowers and only serve to weaken the plant, the flowers being borne at the ends of the old stems. It yields seed, and is easy of propagation by removal of suckers.

C. aurantiacum.—Mentioned as a very beautiful shrub, and the most ornamental of the genus ; is commonly met with in this country.

C. fasciculatum.—A very choice and beautiful pot-plant, of shrubby habit, about three or four feet high, with soft, rough, lanceolate leaves, six or seven inches long ; bears in great profusion, during the cold season, drooping bunches of deep-crimson flowers, much resembling those of a Health. It is accounted a very greedy plant, requiring to be often re-potted, in large pots. It grows with great vigour in the cold months ; but large old plants are almost sure to die off in the rains. It is best to make sure of a stock of young plants, which are easily obtained from cuttings, for the following season.

C. elegans.—Flowers produced in dense, terminal, drooping cymes : purplish-red or slightly tinged with rose also. At Kodaikanal, in the south, elevation 7,000 feet, there are bushes 10—15 feet high by 8—10 feet in diameter. Eminently a hill shrub.

C. corymbosum ; *C. Newellii* ; *C. Parqui* ; and *C. roseum* are highly recommended.

CONVOLULACÆ.

The species of this Order are very numerous, and comprise many plants, producing flowers of exceeding beauty, annual as well as perennial. They nearly all thrive well in this country. There is, however, a considerable degree of sameness in them, in so much that a selection of a few of the most beautiful only is desirable in a garden of limited extent.

PORANA.

P. volubilis.—Native of the north of India ; a most extensive climber, covering the side of a high wall or outhouse to almost any extent : blossoms in November, when its numberless light silver sprays of crowded flowers, each resembling a diminutive Convolvulus have a delightful appearance, springing out of their abundant foliage.

P. paniculata.—Also an extensively scandent shrub, and exceedingly beautiful when in blossom in November ; differs from the preceding in the very hoary appearance of its heart-shaped leaves, and in its sprays of numberless pure-white flowers, having a faint but most agreeable perfume, somewhat resembling that of Lavender. Called the Bridal Creeper.

P. vaccinosa.—Known as the Snow Creeper, is said to be a splendid subject for gardens.

IPOMOEA. Syn. ANISEIA

I. media.—A pretty little creeper, with slender stems and foliage, about three feet high ; bears in the cold season numerous, very pretty and delicate-looking middling-sized flowers of a primrose-yellow colour.

IPOMOEA, Syn. CONVOLVULUS.

I. pentanthus.—More commonly called *Imomoea semperflorens* ; an extensive climber with small slender foliage ; when in full bloom in the cold season, trained over a trellis or garden railings, a most beautiful object with its profusion of middling-sized flowers, of the purest deep azure-blue ; a common plant in gardens about Calcutta. Propagated by division, or from seed, which it bears in the cold weather.

IPOMOEA.

I. muricata—Travellers' Midnight Lilies.—A plant with thick succulent stems, of very luxuriant growth, and wide spreading habit ; bears large, handsome, pale-purple, Convolvulus-like flowers, which only open after dark, and fade away shortly after dawn, the next morning. Sow in October. The plants require a strong trellis for their support.

I. grandiflora—Moon-flower—Similar in nearly all respects to the preceding, except that the flowers are of more expanded form, pure-white and fragrant.

I. rubro Caerulea—Morning Glory.—Native of Mexico; though of perennial duration, becomes worn out, after one season, and therefore can be only cultivated successfully as an annual. A creeper of extensive growth, requiring a large trellis for its support with fine dense foliage of large, smooth, heart-shaped, dark-green leaves; blossoms in the cold season, opening its large, clear azure-blue flowers each morning early in countless numbers, and presenting then as splendid an object as the eye could possibly rest upon. The flowers fade in the after part of the day, turning first to a reddish tint. It is essential that the seed be sown quite as early as July for the plants to grow to perfection by the cold season they do not require a rich soil, but a change of locality each year. Firminger found to be all but indispensable to them. There is a variety with white flowers, but not nearly so beautiful.

I, hederacea.—A remarkably beautiful Ipomoea, bearing very large, pale-blue flowers. By sowings in succession it may be had in blossom nearly all the year through.

I. purpurea—Convolvulus major—Nothing imaginable can rival in beauty a patch of this familiar old creeper, producing each morning a profusion of flowers of every shade of colour, ranging from white through blue and crimson to dark purple. An annual.

I. Quamoclit—Barbadoes' Sweet William—Crimson Cypress-Vine.—A very pretty creeper of slender growth: native of India; produces small vivid scarlet flowers, relieved beautifully by the finely-divided deep-green foliage. When trained up a pole, the plant, as seen from the distance, has somewhat of the effect of a Cypress. Sow the seed in August. There is a variety with white flowers.

I. phoenicea.—A pretty creeper, with small heart-shaped leaves; produces red flowers of the size of a four-anna piece. Proper name *coccinea*.

I. macrorhiza.—A thick-stemmed, extensive, and rather unmanageable creeper, requiring some very powerful means of support; with large rough digitate leaves; flowers large, rose-coloured, very handsome, produced in October. Propagated by portions of the root, which is tuberous, and often of an enormous size.

I. dasysperma.—A pretty climbing plant with fine, rich, dense foliage, concealed in which, for the most part, are produced its moderate-sized pale rose coloured flowers. Propagated from seed.

I. Jalapa.—The name formerly given to *I. macrorhiza* now assigned to a rather stout coarse-growing climber with rough

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crimped leaves ; issued from the Saharanpore gardens, and beating in the cold season lovely flowers of the purest azure-blue.

I. Pes-caprae—Goat's foot Convolvulus—Sea-side Potato.—A wild trailing plant of this country, growing abundantly by the sea-side, with curious two-lobed fleshy leaves, in form like those of a Bauhinia ; produces in the hot season numerous large rose-coloured flowers. *Syn. I. biloba.* It can also be grown on river banks inland. It is an excellent sandbinder.

I. vitifolia.—A very extensive climber of rather slender habit, with leaves much resembling those of a Vine ; native of this country: bears, in February, large handsome golden-yellow bell formed flowers.

I. tuberosa—Spanish Arbour-Vine.—A handsome climber of very extensive growth, with large, finger-formed, rich, glossy-green leaves : flowers large and beautiful, golden-yellow. Raised from seed.

I. polyantha—Auricula-Flowered Ipomoea.—Bears bunches of small yellow flowers of little interest.

I. ficifolia—Native of Buenos Ayres ; described as tuberous-rooted, and bearing large dark lilac flowers, which remain unaltered throughout the day.

I. tyrianthina.—A tuberous-rooted climber, native of Mexico. Sir J. Paxton says, "the flowers are very large, brilliant purple, and borne in great profusion"; and Dr. Lindley states that it is "a splendid plant, superior to most of its allies." Firminger had not seen either this, or the last, in India.

I. aquatica.—The water bindweed, found on the margins of ponds and canals. Flowers purple, like those of the Sweet Potato plant.

I. campanulata.—An indigenous perennial twiner of robust growth and great tenacity of life. Leaves smooth and heart shaped. Flowers purple of varying to rosy-crimson.

I. palmata.—Commonly called the "railway creeper," being so much used at railway stations. Leaves digitate nearly to the base. Nearly always in blossom. There are two varieties—one the commoner, having pale purple flowers (nearly mauve), of medium size, and the other white flowers. This is one of the hardiest creepers in India. Where foliage is wanted to cover a trellis and keep it covered, plant this species.

I. sinuata.—Leaves palmate, glabrous, or slightly hairy. Flower of medimum size, white with purple throat.

I. superbiens.—This is a strong-growing, rather shrubby form of climber. In fact can be grown as a large shrub with the aid of a little pruning. Leaves large, glabrous, cordate. Flowers large campanulate, rosy-mauve, wavy or crisp on the margin. Flowers freely in November. Appears to be synonymous with Woodrow's *I. carnea.*

I. versicolor—*Syn. Mina lobata.*—A light elegant twiner for summer decoration. Leaf cordate at base, three-lobed. Flowers profusely borne on one-side terminal racemes, bright orange crimson, changing with age to orange-yellow. Propagated from seed. This is a very decorative species, easily and quickly grown. It should be resown annually.

I. purga.—Jalap.—Introduced from America and cultivated at Ootacamund and other hill stations for its tuberous roots. The rosy purple flowers are attractive.

IPOMOEA, Syn. BATATAS.

I. peniculata.—A tuberous-rooted, extensive climber, with large, ornamental, finger-formed leaves; bears, in September, large trusses of very large pure purple flowers.

I. edulis.—Sweet Potato—*Shukar Kundo.*—A tuberous-rooted trailing plant, with glossy verdant heart-shaped leaves; bears handsome rose-coloured flowers.

IPOMA, Syn. PHARBITIS.

I. Leari.—Native of Buenos Ayres; a very superb creeper, one of the finest of the whole order; grows over a large extent of trellis, and produces a succession of large fine deep-blue flowers, very similar to those of Ipomœa rubro-cærulea, though not borne so profusely all the year through. Firminger never found it produce seed; but the stems take root wherever they touch the ground, and thus plants are easily propagated.

IPOMOEA, Syn. RIVEA.

I. Bona-nox.—Midnapore Creeper; also called the Goodnight flower.—A creeper of strong woody habit, with round leaves; blossoms in September, opening in the evening its large white flowers which are rather flimsy and unattractive, but which emit a delightful Carnation-like fragrance. Roxburgh says of it, that "in fact it is the Prince of Convolvulaceæ." Produces seed in abundance. *See Rivea hypocrateriformis.*

ARGYREIA.

A. argentea.—A large-growing twining plant, with heart-shaped leaves, the under-surface of which is covered with bright silver-coloured silky down; bears at the end of the rains moderate-sized white flowers with a tinge of rose colour.

A. tiliaefolia.—A sub-scandent shrub or creeper, forming dense masses. Leaves ovate-cordate, slightly hoary on the under-surface. Flowers rosy purple. Fruits like a small Apple.

A. bracteata and *A. pomacea* are dense-growing creepers with rose-coloured flowers and orange fruit.

A. splendens.—A twining plant of most extensive growth, with heart-shaped leaves, the under-surface of which has the same silvery appearance as those of the last; bears in the rains numerous pale pink flowers. Roxburgh says of it, "a most beautiful plant, far exceeding every other species I have yet met with."

A. cuneata.—A scandent shrub, in character and flower wholly unlike either of the two preceding; leaves roundish, heart-shaped, and with no silvery down on their under-surface; bears, at the beginning and end of the cold season, moderate-sized funnel-formed deep bright Tyrian-purple flowers. It is a native of the Mysore country where it may be seen growing wild in every shady spot. Roxburgh observes of it: "This, when in blossom, is one of the most beautiful of the whole order; the large, very bright, deep purple flowers make it particularly conspicuous amongst its own deep, green leaves, and this is much augmented by making it run over any other stout plant with deep green foliage." At the foot of the Nilgherries it produces seed in great abundance; but Dr. Wallich said he had never known it to bear a single seed in the Calcutta Botanical Gardens, and that moreover it was difficult to propagate by layers.

A. speciosa—Elephant Creeper—*Gau-putia.*—An immensely powerful shrubby, twining plant, with great roundish heart shaped leaves; white-tomentose beneath, bears large rose-coloured flowers; quite unmanageable in a garden except where it can be trained up some tree, or over an outhouse. Raised from seed.

LETTSOMIA.

A genus of indigenous trailing climbing, sub-scandent or shrubby plants. Rather coarse, except for the outer fences of the compound. *L. setosa* is a large climber, with pretty rose-coloured flowers in dense clusters. The strong pliable stems of the plant are much used by mâlees and others for binding loads.

NOLANA.

N. atriplicifolia.—A trailing plant, with fleshy succulent stems and leaves, which, unless protected, are very apt to be devoured by sparrows wherever they abound; bears exceedingly beautiful large flowers, much like those of Convolvulus minor, bright blue, yellow and white, having a very pleasing effect on the stems as they hang down over the sides of the pot. Sow the seeds of this, and the two following varieties, in October on the plains and in March or April on the hills, where the plants are to remain, as they bears transplanting badly.

N. paradoxa.—Bears flowers of a dull heavy pale-blue, not attractive in the border, but very beautiful when seen close, being delicately pencilled with fine dark lines.

N. prostrata.—Has pale-blue flowers with white centre, prettily marked with dark lines.

All the above are well suited for rockeries and hanging baskets; should be treated as annuals.

CONVOLVULUS.

C. tricolor—Convolvulus minor.—This beautiful and well-known trailing annual Firminger found did not succeed at all satisfactorily in the vicinity of Calcutta : some seasons it will put forth a flower or two; but more commonly completes its growth and perishes on the approach of the hot season without having produced a single blossom. Sow in October in a light rich soil.

PHARBITIS.

GAYBINE.

P. limbata—Ipomoea hederacea limbata.—A native of Java; described in the seedsman's catalogue as producing flowers with a "fine-pointed star of intense violet-blue, with a broad margin of white." In the plants raised in his garden Firminger did not find the white of the flower so pure and defined as one might, from the description, except it.

BORAGINEÆ.

CERINTHE.

HONEYWORT.

C. retorta.—An annual with unpleasant pale yellow-green, livid-looking foliage. Bears drooping from under the axils of the leaves, bunches of tubular flowers, an inch long, of the thickness of a cedar pencil, one-half deep purple, and the end half primrose colour.

C. major.—With flowers very similar to above but not so bright. Sow in October on the plains and in March on the hills.

ECHIUM.

VIPER'S BUGLOSE.

Plants with disagreeable-looking foliage, attractive only for the bright blue of their flowers. There are several varieties but they

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are not much grown in Indian gardens. Sow in October on the plains and in March on the hills.

MYOSOTIS.

M. palustris—Forget-me-not—Universally known and loved for its beautiful little gem-like blue flowers, with golden eye. A perennial plant ; but will not survive the hot weather, and must therefore be cultivated as an annual. There are other varieties, *viz., M. alpestris* blue; *alpestris alba,* white; *M. azorica*, purple; *azorica alba,* white; *M. dissitiflora,* blue, rather large-flowered; *M. sylvatica aurea,* blue with yellow eye; very pretty.

They all luxuriate in moisture, and therefore should always have the pot in which they grow standing in a pan of water. Sow the seed in October on the plains, and in March on the hills, where it thrives to perfection without any care.

BORAGO.

B. officinalis—Borage.—A plant with very coarse, unpleasant-looking leaves; only attractive for the intense blue of its flowers. Sow in October on the plains, and in March on the hills, in the place where the plants are to remain, as they suffer greatly from, transplanting.

CORDIA.

A genus of trees and shrubs, some of which have handsome flowers deserving of a place in the garden. The most ornamental species are from South America.

C. Sebestena.—A small tree about 15 feet high, with large, rough oval-formed leaves and orange-scarlet gorgeous-looking flowers produced in dense heads, at the ends of the shoots. In blossom during the rains. Propagated by seed, or by layers, which take a very long time before they strike and are fit for removal. Other desirable species are *C. subcordata*, orange-flowered ; *C. decandra,* white-flowered, and *C. nivea*, a shrub with white flowers.

HELIOTROPIUM.

H. Peruvianum—Heliotrope—Cherry Pie.—In most works upon gardening the Heliotrope is stated to be a shrub two feet or less in height. This gives a very poor and inaccurate notion of what the plant is in localities most congenial to it. At Ootacamund, for instance in the Nilgherries, in some gardens it forms a fine, compact verdant hedge, three or four feet high; and in one garden in particular a plant might be seen as much as ten feet in height and forty feet in circumference, in the form of a dense bush, loaded in its season with blossoms. In the plains of India, however, it never attains to a large size. It succeeds very well in the open border, but is sometimes apt to perish from excess of wet in the rains. It blossoms in the later part of the cold weather with its trusses of small lilac flowers, so well known for their sweet, vanilla-like fragrance.

The most successful mode of cultivating this plant Firminger found to be as follows :—Sow the seed in October ; pot the seedlings off singly into large pots, in which they are to remain permanently and treat them in the way directed for producing the Tree Mignonette ; that is, nip off the undermost leaves and bud as soon as they appear, and allow the plant to run up with a clean stem to about four feet high, supporting it with a bamboo stake. When arrived at that height allow it to form a head. Thus formed it will require no further trouble, as it will show little tendency afterwards to give out shoots below. In September of the following season it will come beautifully into blossom full two months earlier than plants left to themselves would do. Three or four plants, thus treated and placed near the verandah, have a very ornamental appearance, and, in the morning particularly, perfume the air delightfully. It is easily propagated by layers in the cold season. There are several varieties between some of which there is no marked difference. But the one called *Voltaireanum*, not uncommon in Calcutta and elsewhere, is a very beautiful and distinct one. The young shoots are of a bluish purple and the unexpended trusses of bloom of a very dark-purple colour ; the leaves, also, are of a finer, darker green.

POLEMONIACÆ.

PHLOX.

P. Drummondi.—A delightful annual, with numerous varieties bearing lovely trusses of flowers, varying through each shape of colour from white to scarlet, deep crimson, almost black, and rose colour ; one of the indispensable ornaments of an Indian garden. English seedsmen now put up seeds in strains, comprising many varieties of colour, including selfs, blotched, striped, and with a light or dark eye in the centre of the flowers. Sow the seed in October in *gumlahs*, and when the plants are two inches high, put them out into the ground. They will grow and flower, after a fashion, in any soil, as they are naturally hardy, but attain their full glory in rich well-manured soil. They are admirable in beds by themselves and also as the groundwork of mixed beds, especially when tall-growing plants are spaced among them. They come early into bloom, and continue in their beauty till the middle of May. Where the soil is left undisturbed, they come up again self-sown the following cold season ; but Sir J. Paxton states, "they do not luxuriate long in the same soil." The self-sown plants should be carefully preserved, as, though not equal to those raised from seed fresh from Europe, they may supply their place, should the European seed fail to germinate. In places of moderate rainfall (say under 25 inches) and without frost, like the Deccan, seeds should be sown in June for the rains garden, and in September for the cold weather garden. Phlox will last well into the hot weather if plentifully watered. In Bombay City Phlox cannot be sown till the rains are over and then comes up well and gives a profusion of colour two months later.

On the hills the seed may be sown so early as the beginning of March under shelter, successive sowings being made up to May, if necessary. As soon as the weather becomes a little warm, put out the seedlings in beds and borders, reserving the choicer kinds for pots.

If seeds be sown in January on the plains, and the plants be kept in pots in the verandah, they will blossom very prettily there during the months of June and July. There is a perennial species, differing from the annual species in being of erect growth and producing larger flowers in great variety. This can only be grown on the hills.

P. paniculata.—This most common species of perennial Phlox, originally introduced from the United States, is a charming plant, which has run, with its congener, *P. maculata*, into numerous pretty varieties producing large heads of red, pink, rose, violet, purple, crimson, white, and intermediate coloured flowers. All do fairly well in the cooler parts of India, but succeed best under pot-culture, each young plant being confined to one shoot. They, in fact, require the same treatment as the Chrysanthemum, strong suckers being removed from the old plant and started afresh. A three months' course of treatment will bring the plant into blossom, and at Bangalore, the best blooms are produced in July. Cuttings of the tender shoots will root under a bell-glass on a hot-bed. For names and colours of varieties, see any good catalogue.

COLLOMIA.

C. coccinea.—A rather dwarf annual : bears erect dense heads of small, vivid, metallic, pale-red flowers ; but as produced in this country not very effective. Sow in October on the plains, where it blossoms in March. On the hills sow in March.

GILIA.

G. tricolor.—A dwarf annual : bears Phlox-like trusses of numerous sparkling flowers of the size of a four-anna piece, pinkish, with dark spots : a charming plant.

G. capitata.—A straggling plant, bearing little resemblance in any respect to the last ; produces dense turf-like heads of azure-blue flowers.

G. achilleaefolia.—Bears dense heads of pink coloured flowers. Sow all the above in October on the plains, and in March on the hills.

LEPTOSIPHON.

A very pretty genus of dwarf annual, remarkable for their fine foliage, and trusses of blooms, varying in colour from white and yellow, to rose, purple, and violet. Sow the seed in pots, pans, or in the open border or beds, in October on the plains, and in March on the hills. They do not bear transplanting well, and it is therefore advisable to sow the seed where the plants are intended to bloom. The following are the best known varieties :—

L. densiflorus.—Bears heads of large purplish-blue flowers *L. androsaceus*, bears violet-crimson flowers, *L. aubeus*, bears orange-coloured flowers. *L. densiflorus albus*, bears fine heads of white flowers. *L. luteus*, bears heads of yellow flowers.

IPOMOPSIS, Syn. GILIA.

I. elegans.—A beautiful plant, closely allied to Gilia, but very difficult to cultivate. It has finely divided foliage, and is a beautiful object when in full bloom, with its bright scarlet flowers, which are produced in March and April. On the plains of Upper India the best time to sow is October, in light rich soil, and the plants protected from the cold after being shifted into the pots where they are intended to remain, or they will perish. In Bengal the protection is hardly needed. Water must be given with great care; too much, and the plants will damp off. On the hills the seed should be sown in May, in pots or pans in a frame of green-house. The soil must be very light. When the leaves are properly developed, the seedlings should be transplanted into pots where they are intended to remain, and kept in a frame or green-house during the summer, and in the stove during the winter. On the approach of the following spring they should be repotted into fresh soil, when they will bloom in great beauty.

COBAEA.

C. scandens.—A rather extensive and very ornamental climber with fine, glossy, finger-formed foliage ; flowers very large, bell-shaped, on first opening of a greenish-sulphur colour, turning some time afterwards to a fine deep purple, and then remarkably handsome. The seeds are usually sown in October with the annuals, and if they germinate, as about one or two out of a large number may do, the plants must be carefully kept through the hot season till the following cold weather, at the end of which, in March or April, they will come into blossom. They require large pots, to which a trellis of split bamboo is attached for their support. The mode of cultivation recommended in England is that the roots be "limited to some space field with lime and brick rubbish, in which the plant blossoms liberally, and of a brighter colour". It is difficult to keep it alive through a second season.

HYDROPHYLLACEÆ.

NEMOPHILA.

N. insignis.—A delightful little annual ; the first introduced and perhaps the prettiest of the species ; bears numerous bright azure-blue flowers of the size of an eight-anna piece. It has thriven well and blossomed beautifully exposed to the full sun in Upper India ; but to be cultivated to perfection it should be grown in a shady spot in a light rich soil of leaf mould, if obtainable ; the roots should always be kept moist, and the collar of the plant always dry. In the vicinity of Calcutta Firminger found it best to reserve the larger portion of the seed of this annual till late in November before sowing, as it will not germinate readily till the cold weather is quite set in ; much, if not the whole of the seed that is sown earlier, either in *gumlahs* or in the open ground, is almost sure to perish. On the hills sow in March in pots, pans, or the beds and borders, where they are intended to bloom, as they do not bear transplanting well.

N. discoidalis.—Bears small, dark-puce, not very showy flowers.

N. atomaria.—Small white flowers, dotted all over ; not very interesting. And *N. maculata*, little inferior to *N. insignis* in beauty ; rather large flowers, with a purple blotch on each petal. There are also other varieties, but they are sub-varieties of the above, and very slightly in colour.

WIGANDIA.

These, which may be raised from seed from England, are described as majestic perennial plants, with large ornamental, undulating foliage. *W. Vigieri* and one or two others have been introduced, and are chiefly remarkable for the silvery down of their leaves and stems. Cultivated on the plains as a winter annual only. *W. macrophylla* is a stately foliage-plant with purple flowers.

EUTOCA, Syn. PHACELIA.

E. viscida.—A handsome annual ; bears numerous bunches of crowded, bright-blue, moderate-sized flowers ; said to thrive best in a poor gravelly soil, and that branches of it continue growing and flowering two or three weeks after being gathered.

E. Wrangeliana.—An annual of straggling, untidy growth ; produces crowded bunches of lavender coloured, not very showy flowers. Both the above are well suited for rockeries. Sow in October on the plains, and in March on the hills.

PHACELIA.

P. tanacetifolia.—An annual of remarkably beautiful foliage, somewhat resembling in manner of growth a very handsome Fern. The flowers, small blue, and of not much merit, are borne curiously upon a long curled spike like that of the Heliotrope. If much wet is allowed to lie upon the collar of the stem, the plants very apt to rot off, particularly when just about to blossom. Sow seed in October on the plains, and in March on the hills.

WEITLAVIA.

W. grandiflora.—An annual of recent introduction and of great beauty; thrives and blossoms well in our Indian gardens; bears numerous bright, pure-blue, small, bell-shaped flowers. There is a variety with white flowers.

W. gloxinioides.—Bears large Gloxinia-like flowers, blotched blue and white.

Seed should be sown in October on the plains, and in March on the hills.

GENTIANACEÆ.

An Order of Alpine herbs, many of which have very pretty flowers. But only a limited number are found in Indian gardens, and those are mostly limited to the hills and colder regions.

LIMNANTHEMUM.

L. cristatum and L. indicum are aquatic or pond weeds found on the plains and usually seen in public gardens. They possess the leaves of a Nymphaea: but there the resemblance ceases, as the small white flowers, with a fringed margin, are not more than an inch in diameter. They are sometimes tinged with yellow in the small throat.

EXACUM.

An indigenous genus of exceedingly attractive flowering herbs. Seen on the grass slopes of the Western Ghauts during the months of February, in hundreds and thousands, they are truly a magnificent sight. But they are never very amenable to cultivation even in gardens near which they are found wild.

E. tetragonum.—A native of swampy fields in Bengal; bears, during the rains, large, beautiful azure-coloured flowers, with golden anthers. Well deserving a place in the garden though Firminger never met with it there. *E. Perrottetii* ; *E. bicolor* ; *E atropurpureum* ; and *E. pelunculatum* are all good plants for Alpine gardens.

CANSCORA.

C. diffusa and *C* : *Wallichii*—are pretty weeds with rose coloured flowers. Only suitable for the rockery.

GENTIANA.

A few species of this pretty genus, such as *G. acaulis* and *G. affinis* should succeed at places like Simla and Darjeeling, in the north. They are wholly unsuited to the tropical part of India.

LOGANIACEÆ.

BUDDLEIA.

B. Lindleyana.—A very ornamental shrub, growing to the height of six feet ; introduced from Chusan by Mr. Fortune; flowers small, but very numerous, pale-pink or rich violet, borne densely upon racemes of blossom, four to six inches long, in unlimited profusion all the warmer months ; requires to be well cut in, in November. Propagated easily by cuttings.

B. Neemda.—Sir J. Paxton says of this : "One of the most beautiful plants of India." A shrub of small growth; flowers milk-white, borne densely on long narrow spikes in January. Propagated by cuttings.

B. Madagascarensis.—A large shrub of very rampant growth, fit only for the shrubbery or outskirts of the garden; flowers in January, small, of a bright pale-orange colour, borne in long, loose, drooping clusters, beautiful to look upon, but emitting a most offensive smell ; should be cut in severely after flowering. Propagated by cuttings.

B. paniculata.—A shrub of little merit, with white flowers.

B. globosa.—This beautiful plant, with its balls of orange-coloured blossoms, is common in English gardens.

FAGRAEA.

F. obovata.—A large evergreen shrub or small tree. Leaf large, glabrous, obovate-oblong. Flower large, tubular-campanulate, creamy white. Fruit egg-shaped, smooth, greyish-purple.

This is an effective plant in the shrubbery.

STRYCHNOS.

S. Nux-vomica and S. potatorum—are important trees of this family. The seed of the former, contained in an Apple-like fruit, affords strychnine, and the latter provides the "clearing nut."

ASCLEPIADACEÆ.

CRYPTOSTEGIA.

C. grandiflora—*Chabuk-chhuree.*—A large, overspreading, and extensively-growing, scandent shrub, throwing out twig-like stems of immense length, bearing, in pairs, oblong, pointed, smooth, deep-green leaves, from three to four inches long; rather unmanageable and requiring an outhouse or a large strong trellis for its support. Its handsome and luxuriant foliage forms a fine foil to the very large, bell-shaped, bright, rich purple flowers which it bears during the hot and rain seasons. Propagated by cuttings in the rains. An inferior rubber has been produced from its juice.

HOLOSTEMMA.

H. Rheedii.—A climbing shrub, with large, heart-shaped pointed leaves, five to six inches long; described as bearing in the rains large clusters of large, thick, fleshy, five-lobed flowers, of a beautiful mixture of green and white colours.

CALOTROPIS.

C. gigantea.—Mudar.

C. procera.—These are too well known to need description. They are unquestionably very handsome flowering shrubs, and nothing but their extreme commonness in the jungle and by the way side excludes them from admission into the garden. For those interested in botany it may be interesting to know that these plants produce pollinia, like Orchids. The pollinia are found round the pentagonal stigma.

OXYSTELMA.

O. esculentum.—A very slender-stemmed herbaceous, creeping plant, with narrow linear leaves about five inches long; a common weed of this country, delighting most in swampy ground by the side of rivers; bears pretty little saucer-formed flowers of the size of an eight-anna piece, white without and rose-coloured and purple-veined within; troublesome to eradicate sometimes when once established in the garden.

GOMPHOCARPUS.

G. frutiocosus.—A very graceful and ornamental small bushy shrub about three feet high, with small linear leaves; very handsome when in blossom in July with its prettily-drooping large umbels of pure-white flowers, displayed in great profusion. It bears a very curious, bladder-like seed-pod, of the size of a small hen's egg, covered with blunt thorns.

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ASCLEPIAS.

SWALLOW-WORT.

A. Curassavica.—Red Head—Blood Flower—Bastard Ipecacu Nha—Jamaica wild Liquorice.—An herbaceous plant about two feet high, with lanceolate, rather downy leaves, two or three inches long; very showy when in blossom in the cold season, with its erect umbels of orange-and-yellow, moderate-sized flowers; bears in great abundance its seed in large curious, inflated pods, from which it is best to renew plants annually, throwing the old ones away.

When young the plants are very liable to be devoured by a particular kind of caterpillar that preys upon them. This should be searched for and destroyed. And when old, the plants often become infested by a reddish-looking aphis or blight-fly, and have then a very unsightly appearance.

A. mexicana.—A simple little unpretending herbaceous plant, about two feet high, with slender stems, naked till near the summit, where it bears decussate, very narrow, linear leaves, an inch and a half long. In blossom constantly through the hot and rain seasons, with umbels of pretty, but not very showy, small white flowers. Raised in Firminger's garden from seed from England.

A. arborescens.—A small herbaceous shrub, bearing handsome umbels of pure-white, Hoya-like flowers. This Firminger had in blossom in his garden, raised from seed brought from the Cape.

TWEEDIA.

T. caerulea.—A small, herbaceous perennial, with leaves rather downy; very pretty when in blossom with its flowers of the palest blue; in size and form like those of *Vinca rosea.* Sir J. Paxton says that if trained to a pole and exposed to light, it yields flowers of a fine azure-blue. Raised from seed, which it bears abundantly.

PERGULARIA.

P. odoratissima.—Primrose or Cowslip Creeper—West-Coast Creeper.—A very extensive climber, with heart-shaped, pointed leaves, of a dull-green colour; bears bunches of flowers resembling those of the Cowslip, but of a dead, heavy greenish-yellow, scenting the air when in blossom during the hot months with most delightful fragrance; not an agreeable-looking plant at any time, and therefore best planted in some situation a little out of notice. Bears in the cold season thick cylindrical seed-pods, six inches long. Propagated by seed sown in February.

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RHAPHISTEMMA.

R. pulchellum.—A large climbing plant with largish, heart-shaped, pointed, smooth flaccid leaves, from four to eight inches long ; described as bearing large recemes of large, rotate, five-lobed straw-coloured, sweet-scented flowers ; a native of this country. Dr. Wallich said it was the largest flowering Asclepiad with which he was acquainted. Propagated by cuttings in the rains.

STEPHANOTIS.

S. floribunda—Creeping Tuberose.—Native of Madagascar. A twining shrub with handsome foliage of oblong, thick, shining smooth leaves, three inches long ; flowers with the tube about an inch long, swollen at the base, and having five spreading oval segments at the apex, pure-white, fragrant, borne in clusters during the hot and rainy seasons ; one of the most choice and delightful plants our gardens contain : bears sometimes in October, a large seed-pod, somewhat resembling a moderate-sized Mango, Propagated by cuttings which should be put down in July or August, in a pot of fine silver-sand, and be kept covered with a hand-glass, and watered as they require it. By November they will become well-rooted ; they should not be disturbed, but allowed to remain just as they are during the cold season, from which they are very apt to suffer, in some sheltered place. In the beginning of March they will begin to start into growth, when they should be potted off singly and kept well watered. On becoming larger they require a bamboo trellis. There is a variety known as ELVASTON, and another as *profusa*, which do not, however, differ much from the foregoing.

CYRTOCERAS, Syn. HOYA.

C. reflexum.—Native of Java. A small shrubby plant with lanceolate, wavy, flaccid, leaves, four inches long ; bears in August lax drooping umbels of creamy-white, middle sized flowers with pedicles an inch and-a-half long ; considered by some a very choice and beautiful plant, but in Firminger's opinion not to be compared with some of the Hoyas. It thrives very indifferently in the locality of Calcutta, and is consequently a very rare plant there. Sir J. Paxton says it was introduced into England grown upon a large log of wood, of which decayed portions and leaf-mould seem highly favourable to its growth.

HOYA.

WAX PLANT.

The species of this curious and interesting genus are rather numerous, but not more than about four or five seem to thrive and

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blossom well in Bengal. Several are natives of Java; some of these are very beautiful, and have occasionally been introduced into Calcutta; but either from want of sufficient attention being paid to them, or from their being ill-suited to the climate they have in a short time died off.

Hoyas seem to succeed best in a material consisting of loose potsherds and broken brick, the interstices filled up with leaf-mould and moss, upon which, when water is poured, it will drain away, almost as through a sieve. Their roots love to cling around the potsherds, and being kept damp by the moss and leaf-mould, thrive with prodigious vigour. Large pieces of old mortar or concrete have been found to suit them admirably.

It is very essential that their leaves be occasionally washed with a sponge, to keep them clean of dust and cobwebs, which are sure to accumulate upon them in a verandah. They produce their flowers in the hot and rain seasons, and have the singular property of blossoming again upon the same footstalks upon which they had blossomed the year before. They are easy of propagation; a single leaf half-buried, stalk lowermost, in fine sand, will soon become a rooted plant. They require shade, and should be grown in pots to which a bamboo trellis is attached for their support.

H. carnosa.—A native of China; thrives well in this country; the most common and well known of all the Hoyas, as perhaps it is one of the most beautiful; a vigorously-growing plant with thick oval, pointed, rich deep-green, shining leaves, feather-nerved, the under-surface of a pale-green, against which its blossoms, borne during all the hot and rain seasons in succesion, are admirably relieved. Flowers in compact even-formed umbels of the most delicate flesh-colour, wax-like, chaste, and glistening. They possess none of the honey-like fragrance which several of the species have.

H. Bella.—A native of Moulmein, with leaves somewhat larger than those of the Myrtle, but similar in form. Described in Curtis as "the most lovely of all the Hoyas; flowers more lively than, and differently formed from, those of *H. carnosa*, and most deliciously scented; the corolla of purer white and corona of a deeper purple, resembling an amethyst set in frosted silver." It is often cultivated in England suspended in a basket, over the sides of which its long lax stems hang down and have a beautiful appearance when in full flower. A rare plant in Calcutta, where it succeeds very indifferently.

H. Paxtoni.—Of this—often mistaken for the preceding, but differing from it in its leaves narrowing off to the end—Mr. Grote had several plants in his garden at Alipore in a healthy condition grown upon a long suspended in the shade, and fastened to it with Cocoanut fibre.

H. Potsii.—A rather extensive climber, with large leaves as much as seven inches long and three and-a-half broad, of a wedge-

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form, with three parallel nerves, flowers of a dull buff colour, not showy, thrives well about Calcutta.

H. mollis.—A very extensively climbing plant; flowers thick, wax-like, with a slight purplish stain in the centre, borne in most beautiful compact umbels.

H. Simmonsii.—A species that used to be in the Agri-Horticultural Society's Gardens.

H. macrophylla.—Native of Java; accounted a very noble species; has large, very thick, roundish-oval, three-nerved leaves.

H. orbiculata.—Native of Prome and Java: specimens in the Calcutta Botanical Gardens seen to thrive moderately well there.

H. longifolia.—A curious narrow linear-leaved species.

H. coriacea.—A native of Java, described in Curtis as "a climbing shrub with the habit of *H. carnosa,* and bearing umbels of yellowish flowers, having a white coronet with dark-brown eye."

H. viridiflora.—Native of this country; a rambling membranaceous-leaved plant with insignificant flowers. A mere weed.

H. imperialis.—Native of the Moluccas; introduced from Madras, where it is said to thrive well in Mr. Grote's garden. A very handsome plant, perhaps the finest of the whole genus, with great smooth fleshy, oval leaves; described as bearing flowers of a fine violet colour, protruding from their centre a staminal crown of yellowish white, and emitting a delightful fragrance.

H. variegata.—Has its leaves spotted with silver white, and bears flesh-coloured fragrant flowers; has been exhibited at the Calcutta shows.

H. Australis; Globosa; lasiantha; picta-aurea, and *rotundifolia* are also met with in India.

CIROPEGIA.

C. Gardnerii.—A very interesting, slender-stemmed, twining pot-plant; bears in January singular Convolvulus-formed flowers, with their mouths parted into five divisions, of a greenish-yellow colour. sprinkled with numerous purple spots. It is tuberous-rooted, and dies down after flowering. Propagated by division of roots in October.

CARALLUMA.

C. fimbriata.—A small pot-plant with fleshy leafless, Cactus-like stems of the thickness of a man's finger, flowers small, white, and chocolate curiously fringed with hairs. Propagated by cuttings.

BOUCERESIA.

B. umbellata.—A leafless plant, with fleshy angular stems like those of a Cactus, of the thickness of a man's thumb, about a foot high : a very sprawling and ungainly object when out of blossom ; bears umbels of hexagonal flowers of the size of a shilling, purplish-brown, slashed with golden streaks, clustered together so as to form a ball of the size of a large Orange: very curious and interesting.

B. crenulata.—Very similar to the last as regards the heads of flowers it bears, but with stems of not a quarter of the thickness.

STAPELIA.

TOAD-PLANT—CARRION-PLANT.

From what Dr. Voigt states it is evident that the Stapelia must be altogether unsuited to the climate of Bengal ; for out of more than sixty species introduced from the Cape of Good Hope by Dr. Carey, he says that none flowered, and that most perished during the rain season succeeding their arrival. *S. variegata* thrives well in Upper India, where it bears its curious, toad-like flowers. These flowers have a foetid carrion-like odour and attract flies that fertilize the plant (cf. Aristolochia).

APOCYNACEÆ.

ALLAMANDA.

A genus of flowering shrubs of extreme beauty, mostly natives of Brazil, ornamental likewise for their foliage, with the leaves borne in a succession of whorls along the stem. Several species have been introduced into the gardens about Calcutta, where they thrive admirably, but there seems some uncertainty with regard to the accuracy of the names given them. They are exceedingly easy of propagation by cuttings and layers. It is stated that some of the species have been introduced into England by means of seed. In the locality of Calcutta Firminger was unware of an Allamanda producing seed.

A. cathartica.—A rather large shrub of scandent and rambling habit: a shrub plant, one of the commonest of the Calcutta gardens ; as well as one of the choicest ornaments of the stoves in England ; flowers very large, pure bright yellow, finely relieved by the rich deep-green foliage, unexpanded flower beds of a bright pure, yellow-green : in constant blossom during the hot and rain seasons : should be well cut in during the cold season to keep it within bounds.

A. Schottii.—The plant so named in the Calcuttta Botanical Gardens differs in no discernible way from the foregoing. But the plant pointed out to Firminger in the public gardens of Bangalore with this name assigned to it, and which he afterwards met with in the garden of Baboo Jibon Kissen Paul, of Hooghly, was a dwarf shrub, not scandent, with flowers not more than a quarter of the size of the foregoing, with the outer part of the tube of the corolla deeply marked with red, and the unexpected flower buds of a dark, dull chocolate red ; quite different, however, from that described and figured in Curtis under the name.

A. neriifolia.—Described in Curtis as "extremely different in habit from any described species as well as in form of corolla, which is almost of a golden colour streaked with orange ; panicles, with many flowers." A plant is stated to have been exhibited at the Calcutta Flower show of 1857 from the garden of Mr. F. Pereira.

A. violacea ; nobilis ; Hendersonii; grandiflora, and *Chelsoni* are also recent introductions into this country, and well worthy of cultivation.

MELODINUS.

M. monogynus.—An extensively climbing shrub, with ornamental bright, dark-green, lanceolate leaves ; flowers not large, star-formed, like those of a Jasmine, pure-white and very fragrant ; bears a fruit of the size and form of a moderate-sized Apple, said to be eatable and agreeable. Propagated by seed and cuttings during the rains.

RAUWOLFIA.

R. canescens.—A small erect shrub, about two feet high ; bears small, insignificant, whitish flowers ; not at all ornamental except for the small Pea-sized berries it is always bearing of different colours, according to their state of ripeness green, bright-red, and black. Propagated by seed in the rains.

OPHIOXYLON.

O. serpentinum.—A very common, small shrub, about two feet high, producing its foliage in crowded whorls on the summit of the stems ; leaves narrow, lanceolate, smooth, shining-green, about five inches long ; bears nearly always its compact, small corymbs of numerous small pure-white flowers, on delicate coral-red footstalks. Sir W. Jones says of it:—"Few shrubs in the world are more elegant, especially when the vivid carmine of the perianth is contrasted not only with the milk white corolla, but with the rich green berries, which at the same time embellished the fascicles." This perhaps, is higher praise than most would be willing to accord it. Easily propagated by division or by seed.

THEVETIA.

T. neriifolia—Zurd Kunêl.—So called from the great resemblance its foliage bears to that of the Oleander: a handsome, small, spreading free, from eight to ten feet high ; native of South America ;

constantly in blossom, with numerous large, thimble-formed, bright-yellow flowers; bears in abundance large Almond like nuts, from which it is easily propagated. These nuts are poisonous.

CERBERA.

C. fruticosa.—A large spreading shrub, bearing, large handsome, lanceolate leaves, from among which nearly at all seasons the rose-coloured flowers, much resembling those of *Vinca rosea,* peep forth and sparkle very prettily. Propagated by cuttings.

C. Tanghinii.—A new species recently introduced.

TABERNAEMONTANA.

T. coronaria.—Called *Chândnee,* "Moonbeam," by the natives. common in nearly all the gardens of India, and certainly as handsome a shrub as they could contain; from four to six feet high, with lanceolate, sharp-pointed, smooth, shining leaves, five or six inches long. Flowers large, double, pure enamel-white, borne almost constantly, and having a delightful appearance as they peer forth from the fine dark-leaved foliage. In the night-time, it is said, they emit a delicate fragrance; in the day they are quite scentless. Commonly known in the south as the "Eye-flower," the juice of the latter being considered a good remedy for sore eyes. Propagated easily by layers or cuttings.

T. dichotoma.—A large, handsome, spreading shrub, occupying a great deal of room, with noble, broadly-lanceolate, rigid yellow-green leaves, nine or ten inches long; bearing, scattered here and there, pure-white fragrant flowers, very similar to those of *Vinca alba.* Eve's Apple, or Forbidden Fruit of Paradise, is the name given to the fruit of this shrub, from the resemblance it bears in size and form to a half-nipped or half eaten small Apple, as well as from its being a native of Ceylon, where Paradise is supposed by some to have been situated. The fruit, believed to have been delicious once became, it is told, a deadly poison after having been tasted by Eve. Propagated by cuttings.

T. recurva.—An exceedingly handsome and ornamental small spreading shrub, with narrow, lanceolate, pointed, very wavy, polished, deep-green leaves, three to four inches long; bears during the hot season a profusion of sparkling white flowers two and-a-half inches across, the corolla consisting of five large flat lobes. Propagated by cuttings.

T. densiflora.—A small, unpretending shrub, with the leaves borne in a crowded manner on the summit of the stem; bears in the rains compact corymbs of very small white flowers; in no way ornamental. Propagated by cuttings.

T. citriflora: *T. amygdalifolia*: *T. Wallichiana.*—These last thre have nothing whatever to recommend them from an ornamental point of view.

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VINCA.

PERIWINKLE GRAVE-YARD FLOWER.

V. alba.—A beautiful, though a very common, herbaceous plant, two feet high, with rich, polished green, smooth, oval leaves, affording a fine foil to the vivid white, large round flowers which it continues to produce at all seasons. Raised from seed or by cuttings.

V. rosea.—Madagascar Periwinkle—Old Maid—In all respects like the preceding, except that the flowers are of a rose colour, and the stems stained with red. When in full blossom, as it nearly always is a lovely plant. Raised from seed, which it bears abundantly. This and the preceding are grafted, sometimes the one upon the other, it is said, with pretty effect.

V. major.—Common Periwinkle—The familiar plant of the gardens and hedgerows in England; bears in March and February its pretty blue flowers, of the same size as those of the preceding. Occasionally met with but by no means a common plant.

V. minor—The Lesser Periwinkle—There is a pretty variegated form of this species not uncommon in Indian gardens, in the cooler stations. Other varieties having white as well as double flowers should be introduced.

PLUMERIA.

P. acutifolia.—Spanish Jassemine—*Gaoi-i-cheen*—*Champa*—A small tree, ten to twelve feet high; not ill-looking when in full foliage, with its large, lanceolate, smooth leaves, nine inches long and two and-a-half wide, borne, crowdedly, towards the summits of the stems, but remarkably uncouth when the succulent, gouty-looking stems are destitute of leaves, as they often are in the cold months: bears during the hot and rain seasons, at the ends of the stems, large corymbs of large, pure-white, exquisitely fragrant flowers, with the interior of their cup yellow. Propagated easily by cuttings. In the cold season it occasionally yields a pair of seed pods or two, but very seldom. In some gardens is met with a very pretty and interesting variety of this shrub, the unexpanded flower-buds of which are of a deep dull crimson colour. The flower when fully expanded has one-half of the under-side of its petals dull crimson, and the other half white. The borders of the petals curl upwards, and are beautifully edged with crimson. The interior of the flowers is perhaps of a deeper yellow than the white variety. This is the well-known Pagoda Tree.

P. alba.—Very similar to the preceding, except in being of more shrubby growth, with much denser and darker-coloured foliage. Flowers entirely white, with rounded expanding petals, and deliciously fragrant. Propagated by cuttings.

P. rubra—The Frangipanni Plant.—Introduced from Jamaica. A small tree of 12 to 20 feet. Possessing the gouty appearance of the genus but bearing dense heads of pretty red flowers. Easily raised from cuttings *P. Jamesoni* ; *P. tricolor* ; *P. lutea*, and *P. bicolor* are ornamental shrubs deserving a place in large gardens.

PARSONSIA.

P. corymbosa.—A very ornamental scandent shrub, about four feet high, with slender stems requiring the support of a trellis and with rich, dark-green foliage of oval, smooth, rigid leaves, one to two inches long ; bears during all the season beautiful closely-crowded corymbs of very small bright crimson flowers. See also *P. albiflora*, the white-flowered species. Propagated by layers.

BEAUMONTIA.

B. grandiflora.—A truly magnificent climbing shrub, with strong woody stems : spreads over an immense space its dense foliage curtain of noble, verdant, oval leaves, nine inches in length and four broad. Flowers trumpet-formed, resembling white Lilies, four inches long and three inches across, corolla expanding at the mouth with five roundish lobes, with a faint Lily-like scent, borne in a large corymb, and covering the plant with an entire mass of blossom from January to March. Of very rapid growth ; a small plant in less than two years will ascend to the height of a lofty tree or trained upon bamboo poles, to the summit of the highest house, attaching itself firmly to anything it approaches wih its powerful rope-like tendrils. Propagated by cuttings or from seed.

B. Jerdoniana—Nearly similar to the last named, excepting that the flowers are somewhat smaller and more cup-shaped. A very free-flowering and desirable climber. Propagated by seeds and layers.

WRIGHTIA.

W. antidysenterica.—A small tree, with smooth, obovate leaves bears in the hot season corymbs of pure-white sweet-scented flowers. Propagated by cuttings in the rains. *Syn. Holarrhena*.

W. coccinea.—A small tree, with smooth, oval leaves, sharp pointed, four or five inches long ; very ornamental in the hot months when bearing its corymbs of numerous flat, regular, five-lobed flowers, two inches across, of the colour and texture of scarlet velvet ; presents also a curious appearance in the cold season, with its large, long, cylindrical seed-vessels suspended among the stems. Propagated by seed sown in February, or cuttings in the rains.

W. tinctoria.—A small tree, with white, fragrant flowers. The wood, which is ivory-white and easily turned, is much used in the manufacture of toys.

ALSTONIA.

A. nereifolia.—A small shrub, neat foliage, much resembling that of the Oleander, but with leaves somewhat broader; flowers of moderate size, star-like, pure-white, scentless, though unpretending in themselves, yet cheerful-looking opposed to the dark-green leaves. May be raised from seed.

A. macrophylla is a large-leaved variety of the above.

A. scolaris.—An ornamental evergreen tree. Suitable for a lawn.

NERIUM.

N. odorum—Oleander—Rose-Bay—*Kunel.*—A large, spreading shrub, six to eight feet high; throws up from the ground its numerous rod-like stems, upon the summit of which is borne its foliage of narrow, lanceolate leaves, surmounted by a profusion of large, cheerful flowers. There are several varieties of this delightful shrub, namely, those with pink, deep-red, white, and variegated flowers, both single and double of each. The double white, however, is a great rarity, though it is said to exist. This shrub may be considered the glory of the gardens of Upper India, where, during the hot season, it thrives vigorously, and being always covered with blossom, scents the whole air round with its fine perfume. In the vicinity of Calcutta it thrives not nearly so vigorously. In the Deccan it may be often seen growing wild by the margins of rivers and jheels, where it looks extremely beautiful. The juice of the stem is said to be a deadly poison. Propagated easily by cuttings, layers or by division. It also yields seed abundantly.

VALLARIS.

V. Heynei.—An indigenous woody climber, bearing twice or three times yearly, a profusive crop of creamy-white, cup-like flowers, of great fragrance. Often cultivated in gardens. Raised from seed.

RHYNCOSPERMUM.

R. jasminoides.—A native of China but naturalized in this country. A slender, climbing shrub, growing to about six or eight feet high, with oval, pointed, deep-green, smooth leaves, about an inch and-a-half long; bears in the hot season, in unbounded profusion, pure-white, sparkling, delightfully fragrant, salver-shaped flowers, nearly an inch across, with the lobes of the corolla curiously twisted; produced in corymbs. A most choice and ornamental plants; requires a trellis for its support. Propagated easily in the rains by cuttings or layers.

ECHITES.

E. caryophyllata—Clove-Scented Echites—*Malutee.*—A very extensively climbing shrub, with bay-like leaves; fastens itself upon, and runs up trees to a considerable height, and during the rains spreads out quite a curtain with the numberless sprays of its fragrant blossoms. Flowers white, of middle size, star-formed, with the petals twisted and irregular. Produces seed in the cold season. Propagated by layers and seed.

E. lisianthiflora.—A shrub of erect growth, about five feet high, in full blossom all the hot season, presenting at that time a very agreeable appearance with its profusion of rather large, pure white flowers. Propagated by layers.

E. picta.—A small, slender, climbing shrub, cultivated only for its ornamental foliage, as here, Firminger stated, it never flowers; leaves narrow, about four inches long, of a very dark green, prettily marked with the white and conspicuous midrib. Propagated by layers.

E. cymosa.—A small scandent shrub, ornamental for its leaves, which are lanceolate, three or four inches long, of a bright glossy green, often prettily marbled with the dark markings of the veins. Propagated by layers.

PENTALINON.

P. suberectum—Savanna-Flower—Deadly Poison Plant.—Native of Jamaica. A large climbing shrub with yellowish-green, verdant, oval leaves, two inches long : requires a stout, high post or bamboo trellis for its support; in constant blossom during the hot season with large, yellow, showy flowers, very much like those of *Allamanda.* Sir J. Paxton says that in its native locality, "whilst other vegetation is perishing from drought, this preserves the beautiful verdure of its leaves, and even continues to flower with the greatest vigour." Propagated by layers laid down in March or April.

MANDEVILLA.

M. suaveolens—Chilli Jasmine—A slender-stemmed, extensively climbing shrub; bears large, pure-white flowers, as much as three inches across, with five twisted lobes, delightfully fragrant. This plant is easily reared from seed, but is difficult to preserve any time in the plains, generally dying off before having flowered. "Blooms towards the ends of the shoots, which, therefore, should not be topped in growing time." Propagated by layers in the rains. Abundant at Ootacamund.

DIPLADENIA.

A genus of extremely handsome climbers and scandent shrubs, natives of Central America. When first introduced into this country they were found not to succeed, owing to the want of proper conditions which have, however, been found in the grass conservatory, where they do remarkably well with a little care and attention. A light, rich soil, chiefly composed of leaf-mould, river sand, and garden loam, with good drainage, suits them admirably. They require a trellis for their support, and are propagated by layers put down in March, which are ready for transplantation in the rains. The following varieties (of which No. 4, with its superb flowers of a pink, changing to rich crimson, is by far the loveliest) are cultivated in Calcutta gardens :—*D. amabilis* ; *amoena*; *Boliviensis* : *Brearleyana*; *hybrida*; *insignis*; *magnifica* (Syn. *acuminata*); *ornata*; and *Regina.*

ROUPELLIA.

R. grata—Cream-Fruit-Tree.—Probably so named from the abundance of cream-like juice it yields when wounded; native of Sierra Leone; a very extensively rambling shrub, requiring considerable space for its full growth, though easily kept small by cutting in. The young stems are of a rich chocolate-brown colour, and the leaves lanceolate, pointed, from three to five inches long, smooth, of rich polished green, and rather thick. Flowers large, leathery, bell-formed, with expanded limb white tinged with brownish-purple, with a crown of ten purple teeth in the throat, attractive just as they are expanding, but not very agreeable on near inspection when fully opened. From the high representation given by this plant, before its introduction to England, it appears to have caused some disappointment on its arrival there. Sir J. Paxton says of it : "It is difficult to imagine a flower with more uninviting appearance." But this is doing it injustice : for though possibly not very ornamental in a stove, it undoubtedly has a handsome and imposing appearance in our gardens, where it thrives well. In the cold season large plants will occasionally bear a seedpod or two, but very rarely. Propagated easily by cuttings in the rains.

SALVADORACEÆ.

AZIMA.

A. tetracantha.—A sub-scandent, densely growing evergreen, spiny, indigenous bush. Being very hardy, this plant makes a serviceable and pretty fence to a garden. The dark-green foliage with dull-white berries, the size of a currant, make a pleasing contrast. The fruit is eaten by native children.

OLEACEÆ.

OLEA.

O. fragrans.—A small shrub, four or five feet high, native of China, of very slow growth, but when in a thriving condition rather ornamental, with its oval, pointed, rigid leaves, of a peculiar bluish tinge ; blossoms from February to March with very small pure white delightfully fragrant flowers, borne in small bunches, situated closely upon the stems. Mr. Fortune says that the Chinese make great use of the flowers to perfume their teas, and that the scent they impart is more abiding than that of any of the flowers employed for the purpose. The plant is much cultivated in the Calcutta gardens, but is always considered choice and valuable from the great difficulty experienced to propagating it ; layers are so long in striking that it is commonly fully a twelve-month before they are ready for removal. Mr. Ross, at one time head-gardener of the Calcutta Botanical Gardens, however, has stated* that the best way is to strike cuttings in sand under a hand-glass, and that with careful shading and judicious watering young plants may be thus obtained, with tolerable certainty, within a much shorter time. Mr. Errington, head-gardener of the Agri-Horticultural Society, however, assured Firminger, that a very large proportion of plants so raised and potted off, perished during the succeeding hot season. Dr. Voigt mentions a variety with red flowers; this was unknown to Firminger.

O. grata.—A neat-looking shrub, in character of foliage hardly to be distinguished from the last, but far more thriving and therefore more ornamental. The flowers possess no fragrance whatever.

O. myrtifolia.—An exceedingly agreeable and chaste-looking shrub, in habit, character, flower, and scent of the flower, so much resembling the Private of the English gardens, that it might be very readily mistaken for it ; in blossom during most of the cold season.

O. capensis.—Likewise a pleasing shrub, very similar to the last, but not blossoming, as Dr. Voigt states, in the locality of Calcutta. The olive tree, *Olea europea*, grows in the cooler parts of India. But does not bear fruit.

LEIGUSTRUM.

L. robustum—Indian Privet—A small tree or large shrub according to position. Usually becoming smaller as it leaves the hills and descends to lower and drier regions.

The creamy-white flowers, profusely borne on terminal panicles are sweetly scented. *L. nilgherrense* is a nice evergreen tree for the hills. Propagated from seed.

NORONHIA.

N. emarginata.—A small evergreen tree introduced from Madagascar. Leaves glabrous and rather leathery, entire, oblong. Flower fleshy on the stems and branches creamy-white. Suitable for tropical India.

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* In a communication to the "Journal of the Agri-Hort. Society."

SYRINGA.

S. vulgaris—The Lilac.—Firminger had never heard of the existence of the old familiar flowering shrub of the English gardens in India ; undoubtedly the climate must be utterly unsuited to it ; for it can hardly fail of having been at some time introduced.

FORSYTHIA.

F. viridissima.—A small shrub of spreading habit, native of China, where, when in full blossom, it is said to be a most beautiful object : blossoms in January when the plant quite leafless with flowers very similar to those of the Yellow Jasmine, but from the scanty way in which they are produced upon the bare stems, the plant, in this country, at least is not particularly attractive. It is said to be benefited by being transplanted, and that it is easily propagated by layers or cuttings.

JASMINUM.

JASMINE.

Chumbelee—Mogra.

A very numerous genus, a few of the species of which claim admission into every garden, some for the fine fragrance of their blossoms, and some for their sparkling beauty when covered with their numerous white, star-like flowers. Some two or three have foliage for which alone they may be considered ornamental ; but several are very coarse-looking shrubs, and far from attractive, except when in blossom. These latter it is well to prune in closely after flowering and keep as small and compact as possible. Many are natives of the hills of India, though thriving well in the plains. All are propagated easily by cuttings or layers during the rains.

J. angustifolium.—A small shrub with long, twig-like stems, along which grow pairs of small, oval, pointed, glossy leaves, about an inch in length ; bears in the hot months, in continued profusion, small, white, star-like, exquisitely fragrant flowers. A delightful plant for perfuming the verandah during the time it is in bloom. Roxburgh says of it : "It is one of the most beautiful species of Jasmine I know. It is constantly covered with leaves, and their bright, shining, deep-green colour renders it always beautiful, and particularly well adapted for screening windows, covering arbours, etc."

J. angustifolium.—An unattractive shrub but for the curious spider like flowers it bears in March, with narrow, white, thread-like lobes, more than an inch long, quite scentless.

J. arborescens.—A tree about ten or twelve feet high, with ovate, cordate, acuminate leaves ; very showy in the cold and beginning of the hot season, when, loaded with its large corymbiferous panicles of large white, fragrant flowers.

J. auriculatum—Jooee.—A small, twining shrub, having large, heart-shaped leaves, with a pair of minute leaflets on their foot-stalks; bears in April numerous middle-sized, white, star-like, very fragrant flowers.

J. azoricum.—A large bushy shrub, with soft downy stems and heart-shaped leaves; remarkably handsome in the month of February, when it bears in great profusion its large, crowded heads of scentless flowers, petals white inside and delicately tinged with red on the outside.

J. candidum.—A shrub with narrow lanceolate leaves two or three inches long; bears in the cold season large, white, five-lobed, periwinkle-like flowers, without scent.

J. caudatum.—A not very attractive shrub; bears in the cold season middling-sized, white flowers with tubes an inch and-a-half long.

J. chrysanthemum.—Roxburgh describes this as a stout shrub, from eight to twelve feet high, with stems as thick as a man's leg, and foliage of dark-green, unequally pinnate leaves; bears corymbs of ten to twenty flowered large, bright yellow, delightfully fragrant flowers; he further observes it is a native of Nepal, and that "in the Botanic Garden it grows freely from cuttings, and becomes a stout, erect, ramous shrub, even small tree, without the smallest tendency to lean or twine. Flowers more or less the whole year, but, like the other species, the proper season is April and May, at which time it is the most desirable Jasmine I have yet seen."

J. coarctatum.—This Roxburgh describes as a very ramous shrub, with no tendency to climb, and says, "it may be radily known, without any other mark, by the great number of flowers which form the little dense corymbs."

J. fruticans.—A common and very beautiful, small, twig-stemmed, twining shrub, with deep, bright-green foliage of ternate leaves, leaflets oval, side ones half an inch and terminal ones three-quarters of an inch long; bears at nearly all seasons five-lobed, bright-yellow, scentless flowers.

J. grandiflorum—Catalonian or Spanish Jasmine—*Jalee—Chumbelee—Kuth-bêlâ—Kund.*—A very pretty shrub with graceful pinnate foliage, the leaflets less than an inch long; in blossom during the hot and rainy seasons with middling-sized, white, fragrant flowers; resembles more than any other species in leaf, flower, and fragrance, the common Jasmine of the English gardens. The flowers are much used for perfume in this country, retaining their odour when dried. When in a thriving condition a rather troublesome plant to keep in order, sprawling over a large extent of space, and emitting roots from its stems whenever they touch the ground. It

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may be trained upon a single stem, which will eventually become as thick as a man's wrist, supporting, at the height of two or three feet, a large bushy head. But thus trained, it is very apt to be blown down by strong winds.

J. heterophyllum.—Of this Dr. Wallich observes : "This ornamental Jasmine is probably the largest of the genus, growing, as I am informed, to a considerable tree." Bears very numerous, yellow, delightfully fragrant flowers, but not in the Calcutta Gardens where, Dr. Voigt stated, it had been more than thirty years without flowering.

J. laurifolium.—A twining shrub of handsome, verdant, glossy foliage; leaves lanceolate, pointed, five inches long; bears in February lax corymbs of middle-sized, white, faintly-fragrant flowers.

J. ligustrifolium—A shrub of low growth, ornamental if only for its privet-like decussate foliage; leaves oval, pointed, deep-green on their upper and pale on their under surface, leathery, bears in February, in vast profusion, small umbels of middle-sized feebly-fragrant flowers.

J. nudiflorum.—A trailing plant of slender habit, native of China, Flowers an inch in diameter, yellow, scentless, borne in great profusion upon the plant when destitute of leaves. Introduced by Mr. Fortune from Chusan in 1854 into the Agri-Horticultural Society's Garden, where it gradually died off; seemingly unsuited to the climate.

J. officinale.—The old familiar shrub, with light, graceful, pinnate, deep-green foliage, and cheerful sprays of fragrant, white flowers, so commonly trained against the sides of houses in England; hardly, if at all, known here, except that a plant of two may be met within the Calcutta Botanical Gardens. None were there in Dr. Voigt's time.

J. pubescens.—A moderate-sized branching shrub, with heart-shaped, deep-green, silky leaves, and the young branches very downy; bears during the cold season principally, in unlimited profusion, crowded downy umbels of large, pure-white, fragrant flowers, at which time it is exceedingly ornamental; a very common plant. Roxburgh says it "is in flower during the rains chiefly." which does not quite accord with Firminger's observation.

J. sambac—Arabian Jasmine—*Bél*—*Bela*—A bushy under shrub, from two to two and-a-half feet high, with ash-coloured branches, and shining oval leaves from four to six inches long and three inches broad; in a perfectly sound and healthy condition would undoubtedly be a handsome plant for its foliage alone; but, from some unassignable cause, scarcely a leaf upon it but is always found either cankered, or partially decayed, or half-nibbled away; in so much that, although indispensable in every garden for the ex-

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quisitely fragrant flowers it produces, it is best allotted a place in the background in an unfrequented spot. There are three or four varieties hardly to be distinguished by the leaves, except that they are rounder and more heart-shaped, and more decrepit-looking, the larger and finer the flowers; blossoms during the hot months. Propagated by layers.

1st. The Single-flowered Arabian Jasmine—Bears more profusely than the other varieties, and more fragrant flowers.

2nd. The Double-flowered Arabian Jasmine—*Râchel.*

3rd. The Great Double Arabian or Tuscan Jasmine—*Mâtiya—Mâgra.*

Bears flowers like little white Roses; in much request among the natives, and sold in great quantities in the bazaars, strung together as neck-garlands. In the flowers of this variety, possibly from the plant having been grown in a too enriched soil, there is sometimes a curious propensity in the petals to become converted entirely into leaves.

J. scandens—A scandent shrub, with oblong-cordate, shining leaves, from one to six inches long; bears in January and February corymbs of numerous pure white, delightfully-fragrant flowers.

J. simplicifolium.—A spreading shrub, with exceedingly pretty, Myrtle-like foliage of oval, highly-polished leaves, less than two inches long; bears in the hot season small, white, fragrant flowers.

J. syringaefolium.—A large twining, bushy shrub, with glossy, rich, Syringa-like leaves; bears in February corymbs of small, white faintly-fragrant flowers.

J. trinerve.—An extensively-climbing shrub, with polished, oval, sharp-pointed leaves; remarkable for the strong manner in which their three longitudinal nerves are marked; bears in February flowers very similar to those of the last.

J. sp.—An unnamed species very common in gardens about Calcutta; a twining shrub, ornamental for its rich foliage of lanceolate, long, pointed, highly varnished leaves, from two to three inches in length; bears constantly, but particularly in February, terminal corymbs of large, sparkling, white, very fragrant flowers, with the tube and underside of two of the lobes purple. The calyces also, as well as the unexpanded buds, which are of a shining purple, have a very beautiful effect intermingled with the white flowers. One of the most delightful of the Jasmines, and especially pleasing when in the morning it perfumes the garden with its agreeable fragrance.

NYCTANTHES.

N. arbor tristis—Night-blooming tree of Sadness—*Hâr Singhâr.*—A tree about ten feet high (more usually a bush) of harsh and disagreeable aspect, common all over India; deserves some situation in the garden, where it can be least seen, for the boundless profusion of small, star-like white flowers, with orange centre, which it bears each night from September to November, scenting at that time the atmosphere for a wide distance around with a delightful honey-like fragrance. The flowers all drop off in the morning, and the ground becomes perfectly carpeted with them. It is of quick growth and the long woody shoots which it bears annually should be cut completely in after flowering. It is propagated by seed sown in rains. Plants should be renewed every third year. Much esteemed by the Hindus.

OSMANTHUS.

O. ilicifolius.—An elegant and compact-growing, evergreen shrub from Japan. Flowers white and very fragrant.

O. fragrans.—Recently introduced, said to be larger and finer than the above. Flowers creamy white.

EBENACEÆ.

This indigenous order of trees and shrubs is of little horticultural value. But the fine evergreen trees *Diospyros Ebenum*—Ebony Tree—and *D. embryopteris*, with green-coloured fruit the size of a large Apple, will be found in Botanical Gardens.

SAPOTACEÆ.

The plants of this order are ornamental only for their foliage, the leaves beign for the most part thick, rigid, smooth, glossy, and very handsome.

CHRYSOPHYLLUM.

C. Cainito.—A fruit-tree of considerable size, but grown occasionally as an ornamental shrub. The golden hue of the under-surface of its large, laurel-like leaves contrasts very beautifully with the dark, rich, glossy green of their upper surface, especially when set in motion by the wind.

SIDEROXYLON.

S. inerme.—A small tree of handsome foliage, in general aspect very similar to a *Pittosporum.*

MIMUSOPS.

M. Elengi.—Bâkul—Mâlsuree.—A large timber-tree much cultivated in Indian gardens for its beauty, as well as for the delightful fragrance diffused by the numberless small, pale-green flowers it bears in Mardh. At tne gardens of the Taj at Agra several handsome

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trees may be seen, and also in the enclosed gardens at the Palace of Deeg. Propagated by seed during the rains.

M. hexandra—Khirni—Ranjani.—Shrub or tree, with glabrous, shining leaves, and yellow flowers. Propagated like *M. Elengi.*

BASSIA.

B. latifolia.—The Mahwa Tree of Central India from which country liquor is made, and from which acetone has recently been manufactured. *B. longifolia.*—The type of the south. Wellknown roadside trees, which scent the air heavily at the commencement of the hot season.

MYRSINEÆ.

MÆSA.

M. ramentacea.—A rather large tree, suited only for a garden of great extent ; very beautiful in the month of February, when in full blossom, with its undoubted profusion of large sprays of very small, pure, milk-white flowers. Propagated by seed and cuttings.

ARDISIA.

A. solanacea.—A large shrub, native of India, from four to five feet high, in every respect beautiful, in foliage as well as in flower. Leaves oblong, pointed, smooth, glossy, somewhat succulent, four to six inches long ; bears at nearly all seasons, compact corymbs of pretty, rose-coloured flowers, arranged somewhat in the manner of those of the Hoya, in form like those of a Potato, having a fine effect, relieved by the dense verdant foliage. The flowers are succeeded by ornamental bunches of small, black, shining berries.

A. crenulata.—A shrub much of the same character as the last ; bears also very similar flowers, but of a whitish colour and not nearly so showy. The ornamental character of the plant mainly consists in the beautiful rose-coloured berries by which the flowers are succeeded.

A. umbellata.—A large shrub like the two preceding, bears corymbs of dull, white flowers, succeeded by an unbounded profusion of black berries of the size of a Pea, in the cold season, when it has rather an ornamental appearance.

A. paniculata.—A large shrub quite distinct in habit from either of the preceding, having somewhat of the aspect of a Dracæna. It sends up long bare stems about ten or twelve feet high, from the summit of which its large lanceolate leaves, from six to twelve inches long, spread forth, and from amongst these project large, long, pink-stalked, plume-like panicles of numberless small, pale-pink flowers. Blossoms principally in February and March.

A. involucrata, A. polycephala and *A. humilis* are additional species.

JACQUINIA.

J. ruscifolia.—A very large, round, bushy shrub, four or five feet high, with narrow lanceolate leaves, from one and-a-half to two inches long, ending in a needle-like point ; bears in the hot season a great profusion of small, star-like, bright-orange, rather pretty flowers. The whole shrub is of a dark, sombre hue, not very agreeable. The wood is exceedingly hard ; and the plant is rather difficult of propagation.

J. aurantiaca.—Is in most respects very similar to the last, except in having somewhat large leaves.

J. armillaris.—BRACELET-WOOD.—A shrub of rigid habit, bearing pretty, white flowers. The seeds are made into bracelets in the West Indies.

PRIMULACEÆ.

PRIMULA.

P. vulgaris—PRIMROSE.—Firminger says, "I have never seen this plant on the plains of India. One of our principal amateur gardeners in the vicinity of Calcutta told me he had taken every possible means he could think of to cultivate it in his garden, but in every instance without success. In the "Journal of the Agri-Horticultural Society' it is stated by Captain Hollings that they had 'the English Primrose in magnificent blossoms at Lucknow on the 30th August, 1844'." On the hills, however, it thrives and blossoms to perfection.

P. var. polyanthus.—This Firminger saw only at Ootacamund, and thriving but very indifferently even there.

P. veris—COWSLIP. *P. Auricula.*—Firminger states : "These two plants are, I believe, utterly unknown in India ; and the attempt to introduce them would, I make no doubt, only result in complete failure."

It may, however, be stated that all the foregoing can be grown to perfection on the hills.

The Chinese Primrose, *P. sinensis*, can be cultivated throughout the United Provinces in the winter season. *P. vulgaris* flourishes at Coonoor and Ootacamund : it also exists, during the cold season, at Bangalore.

CYCLAMEN.

SOWBREAD.

A genus of small tuberous plants, bearing pretty, delicate shuttle-like flowers : not cultivated with success in Lower Bengal but in Upper India, they grow and bloom freely with a little care; while on the hills they come to great perfection. The Cyclamen should be frequently raised from good seed. In this way the improved qualities of several species become blended, as it were. The species mostly recommended are *C. persicum, africanum* and *neapolitanum*. The tubers should be put down in October on the plains, and February on the hills. A soil composed of leaf-mould, river sand and garden loam in equal parts, suits them best. The drainage must be thorough.

DODECATHEON.

AMERICAN COWSLIP.

A hardy genus of perennial herbs. Leaves oblong, spathulate, spreading on the ground. Flowers white, rosy-purple, rosy-crimson or lilac, borne on umbellate scapes a foot or more in height, very pretty. These are suitable rockery plants for hill gardens. *D. Meadia, D. elegans* and *D. giganteum* are desirable plants.

LYSIMACHIA.

LOOSTRIFE.

L. Leschenaultii and one or two other species are indigenous to the Western Ghauts and Pulney hills. Good herbs for the rockery, where their rosy-crimson flowers show to advantage.

PLUMBAGINEÆ.

THE THRIFT FAMILY.

Armeria.

A. cephalotes—SPECIES OF THRIFT.—A dwarf herbaceous edging plant, with narrow grass-like leaves; bears biggish heads of rather large, pretty, rose-coloured flowers called Sea-pinks. Thrives well at Octacamund, and would succeed at all cold stations in the country. There are now one or two other species in cultivation. Propagated from seed and by division of the roots.

STATICE.

SEA LAVENDER.

A genus of extremely showy herbs and undershrubs, producing masses of paniculate flowers in nearly every conceivable colour. Unfortunately they are only suited to the colder parts of India, where occasional plants are seen. They do well at Ootacamund, where they are described as everlasting flowers. *S. sinenis* (yellow), *elata* (blue) and *speciosa* (white) are suitable species for the hills.

PLUMBAGO.

P. capensis.—A semi-scandent shrub, with foliage arranged in a succession of whorls of five unequal lanceolate leaves, 1—2 inches long. One of the commonest, as also one of the most ornamental plants of our Indian gardens; bears in the hot and rainy seasons (practically all the year round) a profusion of pale, azure-blue flowers of the same size and form, and arranged nearly in the same manner as those of the Phlox. Planted against a tree it becomes a climber, but isolated and pruned it becomes a sturdy bush of three feet. At Bangalore and other stations it is much used for lining carriage drives and garden plots—the effect being charming. It does not seed, and cuttings can only be rooted very sparsely with bottom heat. The careful removal of offsets is the most expeditious mode of propagation.

P. larpentæ.—Correct name *Ceratostigma plumbaginoides*—A native of China, much resembles the last but produces larger flowers in more compact recemes, colour violet-blue. Succeeds best in sub-tropical and warm-temperate India. Propagated by the separation of suckers or offsets.

P. rosea.—A small shrub, with prostrate stems; bears in the cold season, long spikes of moderate sized, rosy-scarlet flowers not unlike those of the scarlet Ixora, exceedingly pretty. The beauty of the plant is, however, much impaired by many of the leaves appearing in a more or less decayed condition (this is mostly due to heat and dryness). Propagated by cuttings precariously, but by offsets easily. *P. rosea coccinea* is a grand variety of the above, having large and more brilliant flowers.

P. zeylanica.—Indigenous in many parts of South India, sub-scandent and rather untidy in growth. Bears at nearly all seasons of the year racemes of small, white, sparkling flowers, very clammy and disagreeable to the touch (due to the glandular hairs of the calyx) capable of much improvement by pruning and training. Seeds abundantly.

EPACRIDACEÆ.

EPACRIS.

A genus of plants much cultivated in England for their very beautiful flowers, in general character somewhat resembling Heaths. Altogether unknown, according to Firminger, in India.

There should be little difficulty in growing the Australian Heaths (species of Epacris) in a cool glass-house at hill stations, protection from rain and a moist atmosphere being the chief requisite. Said to be a stove-plant at Ootacamund.

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ERICACEÆ.

ERICA.

HEATH.

A most extensive genus of plants, many of them natives of South Africa, and, except in the solitary instances recorded below, altogether unknown in this country.

E. speciosa.—Of this Mr. M'Murray, some time Gardener of the Agri-Horticultural Society, exhibited in February 1854, a specimen with the following remarks :—

"The accompanying plant of Cape Heath in flower is the produce of one kind of the seed sown in October 1852, from which it will be seen that the plant has made a good growth since that time, and is probably the first plant of the sort which has flowered in Bengal. In addition to this variety of Heath there are in the garden ten other kinds raised from the same batch of seed, equally as healthy but not so large." *

How long these plants survived Firminger was not aware. They were not in existence two years afterwards.

In a list of plants believed to be suitable to the Nilgiri District, the following entry is found :—"Erica, Heath, Herbaceous, two feet. There are specimens in the Botanical Gardens. Grows and blooms well in the open at Coonoor."—*A. G. N.*

ARBUTUS.

STRAWBERRY TREE.

Altogether unknown in India.

AZALEA.

Plants of Azalea, sent by Mr. Fortune from China, were exhibited in bloom at one of the Calcutta Horticultural Shows ; but no plant of this genus can survive the heat of an Indian climate. They thrive to perfection on the hills, where they are almost hardy.

"Azaleas do very well in Ooty and Coonoor,"—*C. G.*

KALMIA.

Quite unknown in this country. Now entered in the Octacamund list of suitable plants.

RHODODENDRON.

No species of this genus of superbly-flowering trees can exist in the plains. Several species are indigenous on the hills. R. arboreum, a tree of 20—30 feet, is indigenous on the Nilgiri and Pulney ranges in the south—elevation 7,000 to 8,000 feet.

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* "Journal of Agri-Hort. Soc.," Vol. IX, p. 10.

At Kodaikanal, some of the specimens are very fine even at a somewhat lower elevation. Flower rosy red.

GAULTHERIA.

G. fragrantissima.—This pretty shrub is indigenous at the same elevation as the Rhododendron and affords an ornament to hill gardens, where it naturally clings to the banks of streams. The contrast between the greenish-white corolla and the enlarged deep-blue calyx, forming the outer covering of the fruit, is both attractive and interesting.

VACCINIACEÆ.

VACCINIUM.

V. Leschenaultii and a few other species are indigenous to the higher elevations of the Western Ghauts.

They are all more or less epiphytic shrubs, with pretty, white rose, or greenish, Heath-like flowers. Only suitable for hill stations.

AGAPETES.

A. setigera.—Sir J. Paxton observes : "A truly magnificent and interesting shrub; native of India. At its roots are immense thick, fleshy nodosities, which coil round the trunk of trees on which they fix, or adhere to some portion of rock in a surprising manner. Any light soil suits it. Its small fibrous roots should only just be covered." Occasionally met with in the Calcutta gardens. Comes into blossom in January and February with clusters of very rich and handsome, tubular, red flowers, in form like those of a Heath, an inch long ; the leaves resemble those of the Oleander, but are smaller. Propagated by cuttings and seeds in the rains. There are one or two varieties of this interesting shrub.

CAMPANULACEÆ.

CAMPANULA.

BELL-FLOWER.

The perennial Campanulas are very numerous, including among them the old familiar Canterbury Bell and Chimney Campanula. Young plants raised from seed sown in October and kept under shelter till the following cold season, and then re-potted in fresh soil, may chance to come into blossom on the plants ; but in the vicinity of Calcutta they rarely do so. Dr. Voigt mentions as many as thirteen herbaceous species blossoming in the Calcutta Gardens during the month of June. It is doubtful if there are so many now.

C. Lychnitis.—An exceedingly pretty and not uncommon pot-plant; bears at nearly all seasons, erect spikes, a foot and-a-half high, of large bright-blue bell-like flowers. Easily multiplied by division of the roots.

C. Media and its numerous varieties (Canterbury Bells) do well on the hills.

"Grows very freely at Coonoor, the small violet kind (possibly another species) a nuisance and difficult to eradicate."—*A. G. Nicholson.*

SPECULARIA.

S. Speculum—VENUS'S LOOKING-GLASS.—An old, familiar dwarf annual; bears small, purplish-blue flowers in great profusion, which remain long in bloom; for effect, requires to be grown in masses.

S. pentagonia bears similar, but larger, flowers; and *Campanula Loreyi* is also very similar. Sow in October on the plains, and in March on the hills.

CLINTONIA.

C. pulchella—*Syn*. DOWNINGIA PULCHELLA.—A dwarf annual suited only for growing in pots; bears little dazzling, gem-like, blue flowers, with yellow and white eye; a truly lovely object when in full perfection of bloom. The seeds are exceedingly small, and to distribute them more evenly it is best to mix them in silver-sand, and throw the mixture pinch by pinch over the soil. Sow in October on the plains, and in March on the hills. The following is the substance of the directions given by Sir J. Paxton:—

"Sow thinly in light sandy soil, as thick sowing is very injurious. Shift continually. Plant three in a pot, the soil of which is comprised of leaf-mould, sand, and well-decomposed manure. In proportion to the richness of the soil, the larger the flowers and the finer the bloom. Well stop by pinching off the tops; and they will flower in a manner altogether surpassing belief."*

They require abundance of water and are best kept with the pots standing in water. In the vicinity of Calcutta Firminger met but with little success in the cultivation of this annual, but in Upper India and on the hills, it comes to perfection. Pretty for hanging baskets, *umbellata and uniflora* are white-flowered species.

CENTROPOGON.

C. fastuosus.—An herbaceous pot-plant, bearing beautiful, bright-crimson, tubular flowers, half an inch long. Two or three

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*"Magazine of Botany," Vol. IV, p. 146.

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specimens were in the conservatory of the Agri-Horticultural Society at one time, but later disappeared. The species is only suited for hill gardens.

C. Lucyanus.—This hybrid is a great improvement on the above, and should certainly be introduced. Flower rosy-carmine.

PHYTEUMA.

HORNED RAMPION.

P. comosum and other species, are desirable herbs for the rockery. But they only succeeded where it is cool and moist ; flowers blue and purple. Easily raised from seed.

LOBELIA.

Lovely little pot-annuals ; continue in blossom a great length of time ; thrive well in India, cultivated in the same way precisely as directed for Clintonia.

L. speciosa.—Bears small flowers of intense smalt-blue with a bright white spot.

L. ramosa.—Bears larger flowers, but of not so brilliant a blue ; the variety of this with so-called red, but in reality pale dull reddish-white flowers, has little beauty to recommend it. There are other varieties such as *erinus*, *pumila*, and *compacta*, bearing blue and white flowers ; while a new variety from Mexico, *Cavanillesi*, is an erect-growing plant, bearing brilliant scarlet flowers.

L. cardinalis—CARDINAL FLOWER.—A perennial herb, two feet, of erect growth, dark-coloured foliage and terminal racemes of pretty scarlet flowers ; has a distinct and pretty effect when massed in a bed. Propagated by seed and division.

L. longiflora.—Rather a weedy-looking herb. Semi-wild in gardens. Flower long-tubular with open mouth, intensely white. Juice said to be poisonous. *Syn. Isotoma longiflora.*

L. fulgens.—A highly ornamental species resembling *cardinalis* but somewhat larger, and downy. Propagated from seed and by division.

L. succulenta—NILGIRI GRASS.—A dwarf, spreading, perennial herb, with grass-like leaves flattened on the ground. Flowers small, pinkish-white, very slightly projecting from the leaves. Very effective for bordering a parterre, or garden plot, as may be seen in the Lal Bagh at Bangalore. Propagated by division.

L. nicotianæfolia—TOBACCO LEAVED—and *L. excelsa* are tall-growing mountain-herbs (usually 8–12 feet) with terminal, dense racemes of large, white flowers. In a garden they are only fit for the shrubbery. Easily raised from seed.

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COMPOSITÆ.

AGERATUM.

A. maxicanum.—An exceedingly handsome plant when in the full height of bloom in the cold weather on the plains, and bearing its numberless, small, tassel-like flowers of a very pure, pale-lavender colour. Sow the seed in August to October on the plains, and in March on the hills; and prick out the young plants into pots, one in each; in October transfer them to the open ground, only one in one spot, as they are very extensively growing plants.

CALLISTEPHUS.

C. hortensis—CHINESE ASTER.—Comprises several distinct varieties, such as—Globe, Hedgehog or Needle, Bouquet, and Perfection, with its several varieties, perhaps the most beautiful. These are of nearly every colour, and nothing can surpass in beauty a group of them in full bloom. The seed should be sown as early as September on the plains, and the young plants pricked out to two inches apart, and afterwards potted off singly into small pots, shifted from time to time to larger ones, with a very rich soil, and watered occasionally with liquid manure. Some will come into blossom in January, and others later in succession. On the hills sow early in March, and treat in the same way. They blossom until the end of November in the open.

China Asters, of which there are numerous fine varieties, are admirably adopted for exhibition in pots. But to obtain the best results, the following details must be strictly observed :—Sow during rainy or moist weather, keeping the soil in the pans thoroughly wet for the first two days, after which, but continuing to keep the surface soil moist, shade and protection should be given until the seedlings appear. Then expose gradually to full sunshine.

Very young seedlings would be knocked about by heavy rain. Prick out to 3—4 inches apart when the first four leaves are formed. Move again when the leaves are touching, then finally into exhibition pots or the open. The finest plants will be found in the ground, from whence they are often carefully lifted into small pots a day or two before the show. Never allow overcrowding and apply liquid manure and other stimulants freely during good rain. A little soot is useful also.

BRACHYCOME.

B. iberidifolia—SWAN RIVER DAISY.—A dwarf plant, with finely divided foliage, presents a most cheerful appearance when in full bloom with its single, daisy-like, blue and white-flowers, which it produces in great profusion. Sow in October on the plains, and in March on the hills, and put out in the border the young plants, three in a spot, a foot apart.

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ZINNIA.

Z. elegans.—A most beautiful and valuable annual, with varieties bearing severally large, gay, crimson, scarlet, and straw-coloured flowers, and forming quite a garden by themselves for a very long season. The double variety appears to have originated in this country. There is also sometimes met with what is called hen-and-chicken variety. The seed should be sown in pots in the middle of June, both on the plains and on the hills, and the young plants put out in the borders by threes ; they soon come into blossom. Those of the double variety give poor flowers at first, but as the season advances, the plants keep on growing and flowering, till they are two or three feet high, and produce flowers then nearly as large as those of the Dahlia, retaining their full beauty a great length of time. Hybrids of *Z. elegans* and *multiflora* are now abundant and satisfactory. But plants raised from seed gathered in the country soon degenerate, and are not worth growing. In a spot where once grown, Zinnia plants are sure to come up self-sown the following season.

Z. pauciflora.—A tall growing plant ; produces flowers very inferior to those of the last ; not very ornamental. *Z. Darwinii* bears conical-shaped flowers, of various shades. *Z. Pumila fl. pl.* of dwarf compact habit. *Z. Haageana, fl. pl.* bears brilliant orange-scarlet flowers. Dwarf and quilled varieties are available.

CALLIOPSIS, *syn.* COREOPSIS.

C. sinctoria.—An old familiar annual, with many beautiful varieties, of which those with deep chestnut-coloured and golden-yellow flowers look exceedingly splendid intermixed ; requires no particular care in its cultivation. Sow the seed in October on the plains, and in March on the hills, and put out the plants in the border when two or three inches high. It comes into bloom in March on the plains and by carefully removing the seed-vessels as they form may be had in flower continually all the hot season. In Poona, and places with similar climate, may be grown as a rains plant.

C. filifolia var. *Burridgii.*—A species with finely divided foliage, bears very handsome flowers with brilliant golden-yellow rays, and large centre of rich crimson-maroon. Treatment same as the preceding. *C. tinctoria nana* is a pretty dwarf variety, *aurea, Drummondi* and *verticellata* should be included in purchasing seeds.

HELIANTHUS.

H. annuus—SUNFLOWER—*Sooruj Mookhee.*—The well-known annual thrives well in India ; the varieties *grandiflorus-plenissimus and Californicus* are remarkable, the first for its enormous flowers, the second for its exceedingly double ones. Some species are distinguished for their silvery foliage ; as *argenteus*, *argyrophyllus*, and *Texanus hybridus* ; one *macrophyllus*, is described as having large handsome, deep-green leaves ; and *uniflorus* as being most gigantic of all, growing to ten feet high. The seeds should be sown in July, both on the plains and on the hills. The plants require no particular treatment, and no care beyond attaching stakes to the tall-growing plants to prevent them being blown down and uprooted.

COSMOS.

C. bipinnatus.—Bears pretty, pink, daisy like flowers on stems two feet high. Sow in October on the plains, and in March on the hills, and plant out in the border in a rich soil.

C. tenuifolius.—Slender-leaved—with its varieties *sulphureus* and *albus*, are charming annuals for the early rains. The Fennel-like foliage is also pretty. In the south of India growth is much better during the first monsoon than it is later in the cool season. An orange-flowered variety has recently appeared in India.

There are now several fine florist's varieties, early and late, tall and dwarf. No flower makes a better table decoration.

SPILANTHES.

S. oleracea.—An interesting dwarf plant with rich green leaves ; bears numerous curious yellow button-like flowers, with dark-brown tops ; very pretty either in pots or in the border. Sow the seed in July on the plains. It does not thrive well on the hills unless grown under glass.

XIMENESIA.

X. encelioides.—A weedy-looking plant with bright yellow dandelion-like flowers of not much beauty. Sow in October on the plains, and in March on the hills.

SANVITALIA.

S. procumbens.—A prostrate-growing plant, covering the ground with its small oval leaves, from among which sparkle its daisy-like flowers with golden rays and deep puce-coloured eye. Sow in October on the plains, and in March on the hills. No particular care required in its cultivation. Ordinary garden soil will suit it.

TAGETES.

T. erecta—AFRICAN MARIGOLD—*Gainda.*—Well known for its handsome, showy, yellow flowers, held in universal esteem by the natives of India ; there are several varieties, some with flowers as large and as double as ordinary-sized Dahlias. Sow the seed in August on the plains, and the plants will be in blossom all the cold season. On the hills sow in June.

T. patula—FRENCH MARIGOLD.—A much dwarfed plant, with comparatively small flowers ; the seed may be sown at nearly any season ; the plants, where once grown, continually reproduce themselves by self-sown seed. There are two or three other varieties, known as *T. pumila* and *Africana* being very dwarf plants, and bearing small flowers, yellow blotched and striped with chocolate, the seed of which should be sown in October on the plains, and in March on the hills.

CALLICHROA.

C. platyglossa.—Bears large, yellow flowers, with dark purple eyes, much like those of Calliopsis. Sow in October on the plains, and in March on the hills.

GAZANIA.

G. splendens.—A pretty trailing herb much used for bordering and carpet bedding. Leaves lanceolate spathulate, silvery on the underside. Flowers large and effective, ray-florets orange with brown and white spots at the base of each ray ; disk paler. Raised from seed cuttings and layers. A desirable garden herb. The treasure flower. Fully open in bright sunlight.

SPHENOGYNE.

Sp. speciosa—A very beautiful annual, with finely-cut, graceful foliage ; bears flowers like those of a single Marigold, with pale straw-coloured rays, contrasting vividly with the large, shining black centre. Sow the seed in October on the plains, and in March on the hills, in good soil, and put out the plants by threes in the border a foot apart. Firminger cultivated this annual with success in the Upper Provinces but not so in Bengal. *Syn. Ursinia pulchra.*

GYNURA.

G. aurantiaca.—An attractive herb from Java, 2—3 feet. Foliage violet-purple owing to its being thickly clothed with short hairs of that colour. Flowers deep orange and unpleasantly scented. Does well under partial shade. Propagated from cuttings. This is the best species in cultivation. *Syn. G. nepalensis.*

MADIA.

M. elegans.—A coarse-growing plant, with large, wooly leaves ; bears numerous largish, daisy-formed, white flowers, with a brown ring round the base of the rays. Sow in October on the plains, and in March on the hills.

CLADANTHUS.

C. Arabicus—ARABIAN CHAMOMILE.—Produces small flowers, bearing some resemblance to those of Chamomile. Sow in October on the plains, and in March on the hills.

RHODANTHE, *syn.* HELIPTERUM.

R. Manglesii.—A very lovely little pot-plant deserving all possible care that can be bestowed in the cultivation of it; bears numerous small, delicate-looking, rose-coloured, everlasting flowers. It has been observed that "few plants brought to Covent Garden Market charm the visitor so much as the silvery, rose-tinted flowers of the Rhodanthe." Sow the seed in October on the plains, and in March on the hills, in a light leaf-mould soil, and prick out the plants into small pots. Shift several times as the plants increase in size, using at the last decayed manure abundantly. All cultivators insist on the great advantage of frequent shiftings of this plant. To Firminger, however, the plants appeared far more effective when several were gorwn in one pot or pan. *R. maculata* is a more robust species with a dark ring round the disk.

R. maculata flore plena is a double variety of the same, bearing rosy-carmine flowers. *R. afrosanguinea* bears dark crimson flowers. *Podolepsis gracilis.*—In all respects very like *R. maculata* and bears pale lilac flowers.

ACROCLINIUM.

A. roseum and *album*.—Bears dry or everlasting flowers very similar to those of the preceding, but very much larger; growing to about three feet high, and is a very ornamental object when in full bloom, as it usually is on the plains, by the beginning of February. Sow the seeds in October on the plains, and in March on the hills, and put out the plants in the border in good soil.

NOTONIA.

N. grandiflora.—A smooth, fleshy herb of three feet. Leaves olive or glaucous green. Flowers yellow in terminal heads. Only fit for the shrubbery.

HELICHRYSUM.

EVERLASTINGS.

Curious for the rather large, dry husky flowers they bear, but of no very ornamental character in the gardens. The flowers remain unchanged for many months, and are often used as an indoor ornament. The plants grow to two or three feet high, and require no particular care in their cultivation. There are varieties with white,

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yellow, and rose-coloured flowers. Sow in October on the plains, and in March on the hills. *H. bracteatum* with its several varieties furnish most useful flowers. The white-flowered are called "Immortelles".

CINERARIA.

A beautiful genus of plants, having a great variety of colours. By nature a perennial, but can only be grown as such on the hills, where it comes to great perfection. Here the seed should be sown early in March in a green-house under shelter of some kind. Prick off the plants as soon as they attain the fourth leaf into small "sixties"—a type of pot. When they have made more growth, shift them again into pots, three in each where they are to remain, using light rich soil. Keep them protected from the strong rays of the sun during the month of June, and they will bloom in great beauty.

At home the Cineraria has been developed by breeding in the same way as Calceolaria, Antirrhimum, etc., and many varieties are available.

C. cruenta.—A herb of the Canary Islands, is the parent of numerous garden hybrids of various colours, and possessing fancy names. See also *C. cruenta Webberiana*.

On the plains of India they do not come to such perfection, they are nevertheless very delightful ornaments of the garden during the cold months. Sow the seed about the middle of September, and treat in the same way as recommended for the hills. Protection from the strong rays of the sun is absolutely necessary to secure success.

C. acanthifolia.—This is an annual of comparatively recent introduction. It is remarkable chiefly for its finely-cut, silvery foliage ; and being of dwarf growth is much used for edgings to borders and beds.

C. maritima.—Very similar to the foregoing, only handsomer and more compact of growth. The leaves are of a beautiful, silvery hue. Neither of these two are cultivated for their flowers, which are yellow and insignificant.

Seeds of both the foregoing should be sown with the flowering varieties, and when the seedlings are two or three inches high, should be planted out in the beds and borders where they are to remain. They do not require much watering.

CACALIA.

C. coccinea—TASSEL FLOWER.—Bears pretty, small, scarlet, tassel-like flowers ; a very common plant in Indian gardens, where it reproduces itself like a weed by the seed it casts about. Always in blossom. Sow in October on the plains, and in March on the hills.

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ANAPHALIS.

On the hills of Southern India, and especially on the Pulney hills around Kodaikanal, there are several pretty compact-growing species of Anaphalis with white or frosted foliage. As seen in their native habitat they are highly ornamental, but unfortunately they succumb on the plains.

SENECIO.

S. elegans—JACOBÆ.—A rather straggling and untidy annual but very handsome when in full blossom, with its numerous large heads of groundsel-like flowers of great brilliancy and variety of colour. In the Upper Provinces, Firminger had it blossoming freely enough, but in the neighbourhood of Calcutta the plants he raised for the most part only completed their growth but to perish on the approach of the hot season without having produced a single flower. On the hills they come to great perfection. Sow in October on the plains, and in March on the hills; the plants require a good soil, and do best in the open border.

CALENDULA.

C. officinalis—MARIGOLD.—This old familiar plant of English gardens should not be omitted from among our winter annuals. It may be had of many varieties of colour from pale straw to deep orange, single and double. *C. O. prolifera* is a curious hen-and-chicken variety. If the seed to be sown is from Europe, it had better not be put in the ground till the cold season is quite set in, otherwise the young plants raised under cover are almost sure to damp off and perish; it is also a most difficult plant to transplant without injury. It is best, therefore, to sow the seed in the border where the plants are to remain. It does not require very rich soil, and when full grown, rejoices in the full blaze of the sun. As English seed cannot be depended upon always to germinate, it is well, where plants have once been raised, to save seed for a future season. To do this, as soon as the flowers have dropped and the seed-heads formed, cover them over with a small piece of muslin and tie round the stalk, otherwise the seeds on ripening will drop and be lost. Sow about the beginning of November on the plains, and in March on the hills.

VENIDIUM.

V. calendulaceum.—A plant of low growth, the large, coarse, weedy-looking foliage; produces flowers which might be easily mistaken for those of the Marigold. Sow in October on the plains and in March on the hills, and put out the plants singly in the border.

ARCTOTIS.

A. grandiflora and *A. speciosa* are highly ornamental flowering herbs. The heads vary in colour from yellow to pale whitish purple. Only open during bright sunlight.

SILPHIUM.

S. laciniatum—THE COMPASS PLANT.—A coarse-looking herb of 3—4 feet, introduced from North America. The young leaves are said to turn their faces to the north and south under full sunlight. Flowers large, yellow. Only suited to hill stations.

CENTAUREA.

C. moschata—SWEET SULTAN.—A well-known old annual; bears heads of thistle-like purple flowers, showy but of no great beauty. *C. suaveolens*—YELLOW SULTAN.—Bears yellow sow-thistle-like flowers. *C. Cyanus*—CORN BLUE-BOTTLE.—A common weed in England, as it has almost become in gardens in India; pretty when grown in patches for the pure azure-blue of its flowers. *C. Americana.* —A tall-growing plant; bears very large heads of lilac flowers. The seeds of all the species should be sown in October on the plains, and in March on the hills, and the plants put out in the border in rich soil.

C. candidissima, syn. CINERARIA.—This is quite a distinct species, being grown only for the sake of its foliage, which is finely cut, and of a silvery hue, and therefore well suited for ribbon borders, edgings, or bedding purposes. This and the following are comparatively recent introductions:—*C. Clementei* has very handsome foliage, completely covered with snow-white down. *C. gymnocarpa* is the most graceful of all, having silvery white leaves. All of the above are of dwarf growth. The seed should be sown in October on the plains, and in March on the hills. When the seedlings are two or three inches high, they should be planted where they are to remain. A gravelly soil with lime suits them best. They need little water.

PYRETHRUM.

P. parthenifolium aureum—GOLDEN FEATHER.—This pretty golden-foliaged herb should be treated as an annual in India, where it rapidly degenerates in the second year. Its uses for carpet bedding are well known. Obtain and sow fresh English seed every year at the burst of the monsoon, or a few weeks earlier. The double flowered *Pellitory*, *P. parthenium* and other ornamental species should succeed at most of our hill stations. All are easily raised from seed.

LIGULARIA.

L. kæmpferi aureo maculata, syn. FARFUGIUM GRANDE.—A well-known pot and bedding plant under shade. The large cordate-orbicular dark-green, shining leaves remind one of the coltsfoot, or Tussilago of the fields at home.

In addition to the type there are one or two garden varieties variously blotched and spotted with yellow, white and rose colours. They are essentially foliage plants, and are only suited to the cooler parts of the country.

CARTHAMUS.

C. tinctorius—SAFFLOWER—*Koosoom.*—Though an agricultural plant, this may be admitted to a place in the garden for the numerous showy, yellow flowers it produces. Sow in July on the plains. It is not worth growing on the hills.

TOLPIS.

T. barbata—BEARDED HAWKWEED.—Rather a bright and showy little annual ; bears large, yellow and white daisy like flowers. Sow in October on the plains, and in March on the hills.

KAULFUSSIA.

K. ameltoides.—A small annual ; bears very pretty Daisy-like flowers of two colours, blue and white. There are varieties bearing rose-coloured and dark-violet flowers also. Sow in October on the plains, and in March on the hills, and put out the plants by threes, when about two inches high, in good soil in the border.

VERBESINA.

V. gigantea.—This large perennial shrub, recently introduced from America, threatens to become a pest at hill stations, where it grows to a height of 15—20 feet. The large, yellow flowers (like single sunflowers) are produced in great profusion during the months of November and December. Although a coarse-looking plant it is, when in blossom, very effective, especially when seen in clumps in the distance.

POLYMNIA.

P. grandis.—A plant of similar habit and growth as the last named, but smaller, more elegant and not so aggressive. Throws out a profusion of large, white, immortelle-like flowers with yellow disks in December. Easily raised from cuttings, and will grow both on the plains and hills.

EUPATORIUM.

E. asperum.—A small, herbaceous plant, tolerably pleasing when in blossom with its numerous groundsel-like, dull-purple flowers.

E. fœniculaceum.—A plant somewhat similar to the preceding, but of smaller habit, and with pale-lavender, smaller flowers.

E. odoratum.—A very pretty, small shrub, each of its blossoming rods having in September and October delicate feather-grass-like appearance, with exceedingly small, densely numerous, very fragrant flowers. Propagated by division of root or by seed.

ASTER.

A. annuus.—A small plant, produces in May small, unpretending, white Daisy-like flowers of little merit.

A. sp.—Name unascertained, an exceedingly common plant in the Calcutta gardens: strongly resembles that figured in Curtis as *A. Sikhimensis*; very pretty when in blossom, as it nearly always is during the hot months, with flowers somewhat like those of the Michaelmas Daisy, but much larger and finer, borne in large heads about a foot from the ground. *Michaelmas Daisies, A. Amellus* and others do fairly well on the hills. They are good rockery plants. Easily multiplied by division of the roots. For the annuals usually called *Asters, see Callistephus Chinensis.*

BELLIS.

B. perennis—DAISY.—Plants of the Daisy, raised from seed sown in October, will come into blossom the same season. The few that prove double should be preserved and the rest thrown away. Those preserved should be potted in well-drained pots, and put in some place under shelter from the rains till the following October, when they should be turned out of their pots, separated at the roots into several small plants, and be then re-potted, or put out in the border in good rich soil. They will blossom beautifully, thus treated, the second season. No plant deteriorates so much if not shifted frequently into fresh soil. On the hills sow in March.

VITTADENIA.

V. australis—THE AUSTRALIAN DAISY.—This pretty, creeping herb, bearing single Daisies in great profusion, is a great acquisition to the Indian garden. It thrives well throughout the Deccan and in the cooler parts of Southern India. For covering mounds, banks, as well as for planting in hanging baskets and under large plants in tubs, there could be nothing prettier. The flowers are pinkish, changing to white with a yellow disk. Very like the field Daisy at home. Being a perennial plant it is easily multiplied from runners. In flower, more or less, all the year round.

SOLIDAGO.

S. Canadensis—GOLDEN ROD.—As common a plant in the Calcutta gardens, and thrives equally well, as in those of England; well known for its long, feather-head-like rods of small, bright yellow, densely-crowded flowers. Propagated by division.

OSTEOSPERMUM.

O. moniliferum.—An African bush of 4—5 feet. Young leaves and shoots covered with a cottony tomentum, otherwise a very bright green. The pretty yellow flowers are succeeded by shining, black, oblong fruit the size of a Pea. A nice shrub. Easily raised from seed.

DAHLIA.

D. variabilis.—Though the Dahlia thrives well and blooms freely on the plains of India, it very rarely produces those fine, handsome, fully-double flowers which make it so conspicuous an object of beauty in the gardens of Europe and on the hills. *D. excelsa*, *D. coccinea*, and *D. imperialis* are species from which numerous beautiful varieties have been raised.

The following will perhaps be found the most advisable mode of cultivation on the plains. About July the tubers begin to start. They should then be just covered over with some light mellow soil and watered. When they have made shoots about two inches long, take them up and slice off each shoot with a penknife, together with a small piece of the tuber. Plant out these shoots in a flower-pot filled with sand, and keep them watered. They will soon establish themselves as young plants. When they have done so, remove them into the pots or border where they are finally to remain, and they will blossom in November and December.

The great object to be aimed at is, by every retarding process that can be adopted, to prevent the plants from opening their flowers till about the middle of December. This must be obvious to any one who has observed how often the same plant that has commenced blossoming with all but single flowers in November will, as the cold season advances, produce them more and more double.

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It is important that from an early period they be carefully supported with stakes, or they will be sure to be blown down and be destroyed.

About February, to facilitate the ripening of the tubers, discontinue watering. When the stems decay, cut them down to within an inch of the soil. Then take up the tubers carefully, so that the upper part of them, in which alone the eyes are situated, be not broken or injured. They should not be left exposed long to the air, or they will be apt to shrivel and perish ; but as soon as they are quite dry, they should be laid in a *gumla*, and be covered well over with dried earth and stored away in a godown.

"The buds or eyes," as Mrs. Loudon states, "are not scattered all over the tuber, like those of the Potato, but collected in a ring round the collar of the root, and when in a dry state are hardly perceptible. To discover them, nurserymen often plant the tubers in a hotbed 'to start the eyes'. Tubers are sometimes blind, and though put into the ground, and sending out abundance of fibrous roots for several years, still never send up a shoot." The surest way of obtaining plants that produce fine flowers is to procure tubers from Europe. These, however, wear out, and become almost valueless after two or three seasons. Seed sown in October will produce plants which come into flower in February, of which one perhaps out of some twenty may be considered worth keeping, and the rest as only fit to be pulled up and thrown away.

No plant is more easy of propagation by cuttings than the Dahlia. The tips of shoots nipped off and planted in a flower-pot half full of river sand, with a pane of glass laid over it, will almost to a certainty all strike and soon form young plants.

On the hills the tubers should be put down in May, and no further care or attention is needed, as they come up and bloom to perfection. After flowering, the tubers are usually left in the ground, but it is better to take them up and put them away in dry sand till the time comes round for putting them in the ground again.

This is another "Florist's Flower," which has been greatly improved of late years, and like the Chrysanthemum, is now classed under headings denoting the peculiarity of each strain, as Fancy, Cactus, Pompone, Show, etc. But single-flowered Dahlias are now exceedingly pretty, and, perhaps, take the lead in popular fancy.

Many of them become double after a few years' cultivation in the cooler parts of this country. The double Cactus-flowered Dahlia is also of special merit. For the names of varieties see any good seed list.

At Bangalore and throughout the Deccan generally the Dahlia begins to grow with the first burst of the S.W. monsoon. Consequently it is in full bloom in the months of July and August.

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RUDBECKIA.

Herbaceous plants, bearing large, showy, but coarse-looking, bright yellow, ox-eye Daisy-like flowers. Best renewed from seed sown annually in October on the plains, and in March on the hills.

R. triloba.—A common weedy-looking plant, nearly always in blossom, with large yellow flowers, having a great ugly cone-shaped eye in centre. Propagated by division.

GAILLARDIA.

G. picta.—An herbaceous perennial, of which there are several varieties; an invaluable ornament for the garden, enlivening it all the hot and rainy seasons with numberless large, bright, Marigold-formed, copperish-red, orange and yellow flowers. Best renewed annually from seed.

ACHILLEA.

A. millefolium—MILFOIL.—An herbaceous plant, always handsome for its graceful, divided, feather-like foliage; flowers rather small, very numerous, and of very long duration, pure white, borne in large, compact flattened heads. There is a variety with rose-coloured flowers. Propagated easily by division.

A. nobilis.—Also a handsome plant for its foliage, which though quite distinct, somewhat resembles that of the last; flowers white.

CHRYSANTHEMUM.

C. carinatum.—With its two or three varieties, one of the most showy annuals of the garden; bears Daisy-like flowers as large as a watch, with white or yellow rays and dark-brown eye. The seed is sown in October on the plains, and in March on the hills, and the young plants are put out by threes, a foot apart, in good enriched soil in the border. *C. frutescens*, a shrubby plant, is the Marguerite, or Paris Daisy.

The newer varieties are *C. carinatum aureum*, with golden leaves; *C. coronarium* with very double, lemon-coloured flowers; *C. japonicum*, having several varieties of tall growth; *C. segetum grandiflorum*, bearing large, sulphur-yellow flowers two inches in diameter. These are all desirable varieties to cultivate.

C. indicum.—A common plant, native of this country, very showy, when in full blossom in November, with its profusion of bright, cheerful, golden-yellow, middle-sized flowers; does best in the open border, and requires little care bestowed upon it beyond removing it annually to fresh ground.

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C. sinense—THE FLORISTS'S CHRYSANTHEMUM—*Gool-dâudee—Chundro-moolik*.—Of this delightful plant, so well known and so universally cultivated, and which, during the months of November and December, makes our gardens so gay, most of the handsome varieties may be now met with in India.

The best way of treating the plant, according to Firminger's experience is as follows :—"About the beginning of January, or directly the flowers fade and become unsightly, cut the flowering stems close down. Turn the plant out of its pot, if it be in a pot, or if it be in the border, dig it up. Remove the whole of the earth from its roots, and then pull it completely to pieces, by tearing apart each separate shoot and sucker. Prepare a piece of ground in a shady spot by digging it up and rendering it mellow with a mixture of old manure and a little sand. Put down the shoots and suckers in the manner of cuttings in rows a foot apart, and a foot between each shoot in the row. Water them daily and they will soon establish themselves and grow with great vigour ; and by the end of May become large plants with numerous ground-shoots. They should then be taken up, and the shoots pulled apart at the roots, and each separate shoots planted singly in moderate-sized pots, in which they may remain under shelter from the heavy rains till October. They should then be re-potted into ample-sized pots and a new soil. Some few left in the border will survive all extremes of weather, but the safer plan is to put all that room can be found for under shelter."

The Chrysanthemum is subject in the cold season to the ravages of a large, white, bettle-maggot, which preys upon the roots, and eats away the whole of their fibrous parts, thus eventually destroying it. When a plant under proper cultivation appears in a languishing state, it may often be referred to this cause, and it should be turned out of its pot, examined, and re-potted in entirely fresh soil.

The Chrysanthemum is a coarse-feeding plant, and requires a good rich soil and abundance of water ; it is benefited by repeated applications of liquid manure; and also, it is said, of soap-suds.

Mr. Fortune has described the method of cultivation adopted by the Chinese which, he says, brings the plant to great perfection. One peculiarity in their treatment consists in a liberal use of night-soil and in planting them at once in large pots. "The plants," he states, "are trained each with a single stem. This is forced to send out numerous laterals near its base. These are tied down in a neat and regular manner with a string of silken thread. By having the plants clothed with branches in this way, and by keeping the leaves in a green and healthy state, the specimens never have that bare and broom-headed appearance which they often present in England."*

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* "Tea Districts of China", p. 124.

To obtain unusually dwarf specimens, Sir J. Paxton says :— "Directly the flower buds are formed, the tops of the shoots producing them are cut off at any desired length and planted in sandy loam. They will form adequate roots and flower as well as those not decapitated. We have them not more than six inches high." * This, however, is a proceeding, Firminger believed, not always found successful, and rarely resorted to. The specimens exhibited in the English shows have usually their stems from five to even seven feet high.

The perennial Chrysanthemum is essentially a 'Florist's Flower' and its varieties, in at least half a dozen well-defined classes, are now very numerous. But in the absence of good cultivation it will be found that most of the varieties degenerate very rapidly in this country. Successful growth can only be assured by rich feeding during the growing season, which extends from March till July at Bangalore, and again from September till January, or even a month later, in many parts of the country. To attain this a suitable compost, sufficient root-space and plenty of water must be provided. A good general compost for nearly all plants of the Compositæ should consist of the following ingredients :—

2 parts red loam, failing that turf loam.
1 part night-soil.
1 " horse-manure (9 months old).
½ " fine sand.
½ " Hongey (Pongamia glabra) flowers—rotted.

The above should be thoroughly mixed and stacked at least three months before the compost is required for use. While in stack, or heap, give the whole a good drenching with liquid manure twice a month. Before using, mix the ingredients well a second time. Composts should, of course, be protected both from heavy rain and the direct action of the sun. To further enrich a general compost such as the above, small quantities of fine bone-meal, soot, nitrate of soda, and dried blood could be added. But as a rule these fertilisers are applied at a later stage of growth, as in the final shift into exhibition pots, when the plant has attained a condition needing the greatest amount of sustenance. Re-pot two to three times, using larger pots and richer soil each time. Drain well, placing a few lumps of charcoal among the crocks. Remove all suckers, and allow a single shoot (leader) with its primaries to form the plant. Superfluous buds should be removed at an early stage of formation. In the case of exhibition flowers only a few terminal buds would be left.

ARTEMISIA.

A. abrotanus.—SOUTHERNWOOD.—The old familiar shrub of our English gardens, so much used in bouquets for the agreeable fragrance of its leaves ; not uncommon in the gardens of Calcutta, where, however, it attains only to a small size, and is generally grown in pots. Propagated by slips.

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* "Bot. Mag", VII, p. 191.

A. latifolia—Sometimes misnamed *A. odoratissima.*—An herbaceous plant, at all times pleasing for the peculiar whitish hue of its foliage ; continues in blossom all the cold weather, when a clump of it looks remarkably beautiful with its heads of densely-crowded, small, milk-white flowers, which in the heat of the day diffuse a most delicious fragrance for some distance around. Easily propagated by division of roots.

CROSSOSTEPHIUM.

C. artemisioides.—A curious dwarf shrub, remarkable for the strong, vitriolic odour of its small, whitish-green leaves ; affords, on account of its very peculiar foliage, a pleasing variety among other pot-plants ; bears a profusion of clumps of small, dingy yellow flowers. Propagated by seed, which it bears abundantly.

ARGYRANTHEMUM.

A. frutescens.—A perennial herb, 2 feet, introduced from Teneriffe. The finely-divided foliage, surmounted by a liberal display of white, immortelle-like flowers on longish stacks, constitute an attractive plant suitable for the centre of large beds.

Propagated from cuttings under a bell glass.

SITHONIA.

S. speciosa—RED SUNFLOWER.—This very decorative plant grows 6 feet high and produces flowers of a brilliant colour. Sow in the beginning of the rains in the Deccan and the plains of Central and South India.

DIPSACEÆ.

SCABIOSA.

S. atropurpurea—SCABIOUS—DEVIL'S BIT.—Bears large, handsome, globose heads of dark-purple blossoms. Sow in October on the plains, and in March on the hills ; the plants will not always flower the same season, but if kept over till the following cold season will blossom early then. A variety has been produced with scarlet flowers.

Varieties are now plentiful giving pretty flowers of blue, white-rose, purple, yellow and lilac colours.

DIPSACUS.

D. Fullonum—FULLER'S TEASEL.—This British plant has been successfully grown in Poona under irrigation. The toothed dry head is used for combing up the pile on woollen fabrics.

VALERIANACEÆ.

An order of annual and perennial herbs or undershrubs. Mostly confined to the colder parts of the world. Representatives found in India are alpine plants. A few introduced species are found in Botanical Gardens at hill stations.

CENTRANTHUS.

C. ruber—RED VALERIAN.—An annual herb, 3 feet, with fine corymbose panicles of pretty red flowers. There are several varieties having even finer flowers of different colours, one being white-flowered. All are suitable for the hills and do well in borders and rockeries. Raised from seed purchased in Europe.

C. macrosiphon—LONG-SPURRED VALERIAN.—A plant 2—3 feet high, with ovate, much-toothed leaves; bears large, dense heads of small rosy-red flowers; a showy annual. Sow in October and put out the seedlings in the border when 2—3 inches high.

NARDOSTACHYS.

N. Jatamansi.—Spikenard of the ancients; a small unattractive. herbaceous pot-plant, native of the Himalayas, and rare in Calcutta; bears small, dirty-white flowers in March, on a long, erect spike, in much repute for their fragrance.

RUBIACEÆ.

SERISSA.

S. fœtida.—A very pretty small shrub, about two feet high, with very small, dark-green shining leaves; native of China; nearly always in blossom with its sparkling, very double, white flowers, of the size of a shirt-button, which, when bruised, emit a detestable smell. Single-flowered specimens are also to be met with, but not so common. Easily propagated by slips or cuttings, or, it is said, by cuttings of the roots.

PSYCHOTRIA.

P. undata.—A shrub of moderate size, with foliage of a pale lurid green; bears in April and May compact heads of greenish-white flowers; not at any time a very agreeable plant.

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P. jasminiflora.—A shrub with white, funnel-shaped flowers. Very beautiful. *P. cyanococca* is a herb having pretty white flowers and bright-blue fruit in clusters. Not suited to the plains.

COFFEA.

C. Bengalensis.—A small shrub, exceedingly beautiful in the month of February, when in full blossom, with its pure-white flowers, similar to, but smaller than, those of the White Periwinkle, in such countless profusion as to produce a most brilliant effect in the border. Propagated by seed.

C. arabica—THE COFFEE-PLANT—*Kuhwa.*—A much larger and taller-growing plant than the last; bears flowers somewhat similar but rather scantily, and is not nearly so interesting in an ornamental point of view. Propagated by seed. This plant can be grown over a wider range of soil and climate than is generally believed. For example, while it does particularly well on the Nilgherries, it also produces useful berries on the sea-coast near Bombay, and above the Western Ghauts at Poona.

LINDENIA.

L. rivalis—The only species of the genus. A handsome shrub, 3 feet, bearing large, white, tubular flowers with expanded mouths. A light, rich soil suits it, with protection in the conservatory, where it opens its flowers in the hot and rainy months. Propagated by cuttings in the rains.

KNOXIA.

K. corymbosa.—An erect-growing annual of 3—4 feet, commonly found on the hills of Southern India. The small, purple flowers are copiously produced in terminal cymes of 4—6 inches in diameter. Attractive, but not much seen in gardens. The species *mollis* and *Heyneana*, differing slightly in size and colour, are abundant on the Western Ghauts. Raised from cuttings and seed.

OXYANTHUS.

O. tubiflorus.—This fine shrub from Sierra Leone has recently been introduced, and should succeed on the plains. The white tubular flowers, half a foot in length, are sweetly scented. Raised from seed. *Syn. Gardenia tubiflora.*

PAVETTA.

A genus of plants in general appearance hardly distinguishable from the *Ixoras.*

P. indica.—A large jungle shrub with large, laurel-formed, dark glossy-green leaves, with white midrib. Its foliage is its principal point of beauty; bears in February trusses of dirty-white, rather fragrant, flowers.

P. tomentosa.—A large, coarse shrub; bears loose heads of white flowers of little merit otherwise than for their fragrance.

P. Richardiana.—A shrub with small, neat foliage; bears small, white flowers of not much merit.

P. diversifolia.—A single plant of this was introduced from the Mauritius into the Calcutta Botanical Gardens, where it throve well; remarkably ornamental for its large, laurel-formed, glossy leaves, which, when young are beautifully marbled.

IXORA.

A genus that comprises several of our most beautiful flowering shrubs, the splendour of which, when in the full perfection of their bloom, nothing can surpass. During the time they are in bloom an occasional application of liquid manure will be found beneficial, and after they have done blooming they are the better for being pruned in closely. Some yield seed freely, from which young plants may be easily raised; and all may be propagated more or less easily by cuttings or by layers put down in the rains.

A writer, who signs himslf "Alpha," says:—"All the varieties are easily propagated by cuttings; but some of them, as *salicifolia, Griffithi,* and *acuminata,* are so wanting in the tendency to form bushy plants, that well-furnished specimens of them can hardly be obtained save by grafting them on good-sized, well-bottomed plants of some better-habited variety. Coccinea is, judging from my own experience and observations, the best for grafting upon. I also graft *floribunda,* which, although of a sufficiently bushy habit, is rather delicate and but a slow grower on its own roots. *Acuminata* throws very large heads of bloom; and I expect that, grafted on *coccinea,* it will form fine specimens and be more effective than *alba.*" *

I. acuminata.—A shrub five or six feet in height. Roxburgh describes it as "a very charming shrubby species; native of the forests near Sylhet, where it blossoms during the hot season and perfumes the air with the fragrance of its flowers." And Wallich adds: "The opaque, remarkably pale and glaucous leaves, the subsessile crowded corymbs of large white blossoms, with white calyces, sufficiently distinguish this elegant shrub from all the other species."

I. alba.—A small shrub, native of China, with handsome rich foliage of lanceolate leaves, from three to six inches long; generally considered a variety of *I. stricta* (*Syn. I. chinensis Lam*). One of the most choice and beautiful plants of the whole genus; bears its large, full, close corymbs of milk-white, scentless flowers in great profusion during the hot and rainy seasons, but in highest perfection in the months of March and October. Bears no seed, but may be propagated with little difficulty by layers or cuttings.

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* "The Florist and Pomologist", Vol. for 1863, p. 45.

I. bandhuca.—A round bushy shrub, of moderate size, about the commonest of the genus; distinguished from *I. coccinea,* which it resembles, by the leaves ending in a blunt, oval form and by the close way in which their heart-formed base embraces the stem; bears its compact, beautiful corymbs of fine scarlet flowers throughout the whole year, but in perfection during the rains. It requires to be pruned in about November, or it is apt to become straggling and unmanageable. May be propagated by seed, which it bears abundantly in the cold season, or by layers and cuttings, which in the rains root with the greatest readiness.

I. barbata.—A shrub of very large growth, with fine rich, deep-green, lanceolate leaves nearly a foot long; bears in the hot season large, lax, irregular corymbs of long-tubed white fragrant flowers, singular for the fringe of white hair round their mouths. Produces seed in the cold season.

I. brachiata.—A stout, not very ornamental shrub; bears in March panicles of minute white flowers. Seeds in May.

I. coccinea.—A shrub about three or four feet in height, about the commonest, and certainly about the most beautiful, of the genus. Flowers bright scarlet in large, compact, handsome corymbs; nearly always in blossom, but in perfection during the rains, when it is a truly splendid object. Nothing can be finer than the contrast afforded by the glowing scarlet trusses of bloom against the dark rich bay-green of the leaves. Wields seed in the cold season.

I. crocea or crocata.—A choice shrub of the English stoves; bears handsome trusses of fine orange-coloured flowers. Unknown in this country. (By some considered synonymous with *I. chinensis, Lam.*)

I. cuneifolia.—A shrub of tree-like growth; bears in March and April a profusion of compact balls of pure white fragrant blossom, of the size of an Orange, which present a truly delightful appearance as they wave to and fro by the force of the wind. Ripens seed in September.

I. grandiflora.—Sir J. Paxton says it is only a large-flowered variety of *I. coccinea.*

I. superba.—The proper name of the plant, misnamed *I. grandiflora,* native of Assam; from not more than about a foot and-a-half to three feet in height; extraordinary for the immense size of its leaves, and when in blossom in April, with its huge head of white flowers, very suggestive of a great overblown Cauliflower.

I. fulgens.—Roxburgh observes :—"This elegant highly ornamental shrub is a native of the Moluccas, and from thence was introduced into the Botanical Gardens, where it blossoms most part of the year." Has smooth lanceolate leaves from six to eight inches long and bears corymbs of numerous long-tubed, pretty large, scarlet flowers.

I. hydrangeaeformis.—Discovered by Mr. Griffith at Singapore and described in Curtis as a noble shrub, with fine lanceolate leaves a foot long, producing handsome trusses of rich yellow and orange coloured flowers, superior either to those of *I. coccinea* or *I. stricta*.

I. incarnata.—A small choice shrub, native of China, with fine dark-green foliage ; considered, like *I. alba,* a variety of *I. stricta* ; nearly always in blossom with corymbs of pretty flesh-coloured flowers. Propagated only by inarching ; cuttings and layers do not succeed.

I. javanica.—A small shrub, accounted one of the very finest of the genus ; but such as are met with in the Calcutta gardens are very far from meriting that high rank. It suffers during the cold months, and young plants at that period can with difficulty be kept alive. Distinguished by having leaves, softer and less rigid than others of the genus ; bears during the rains compact corymbs of orange-scarlet flowers rather inclining to an apricot colour. Sir J. Paxton remarks that this plant is remarkably handsome from "the younger branches being of a rich coral colour, the tube of the corolla an inch and-a-half long, and the limb an inch across :" points as regard size and colour not found in the plants we have here.

I. lanceolaria.—A shrub about five or six feet high, remarkable for its narrow leaves, six inches long and one broad ; bears in the hot season greenish-white flowers, and seeds at the beginning of the cold season. Wallich observes :—"This species is so distinct from all the others as to be easily known. Its slender hanging branches, pallid and glaucous leaves, and the small corymbs of crowded flowers contribute to render it a very ornamental plant in the shrubbery."

I. longiflora.—A handsome lanceolate-leaved shrub ; bears in August and September lax corymbs of exquisitely fragrant white flowers with exceedingly long tubes.

I. opaca.—A large shrub, compared with other species, of rather coarse appearance ; bears large corymbs of very fragrant white flowers, before opening prettily tipped with red.

I. parviflora.—A small tree ; bears in March small dingy white, somewhat fragrant flowers. Not attractive when in flower, and far from being so at any other time.

I. rosea.—A shrub about five feet high, of spreading habit, with oval, smooth, firm leaves, about six inches long ; flowers of the same colour as those of the last, but larger, and in larger loose corymbs. Wallich remarks :—"This shrub is exceedingly elegant on account of its large round corymbs, which for eight months of the year are produced in a constant succession. The colour of the flowers is a pale pink, gradually becoming reddish as they grow old, beautifully contrasting with the shining dark-green leaves, which are not unlike those of *I. bandhuca*." (Also believed by some to be synonymous with *I. chinensis, Lam.*)

I. stricta.—A small woody shrub, three or four feet high, of erect growth, rather scanty both of stems and of foliage ; leaves oval, smooth, about five or six inches long ; bears, more particularly in March and April, large, very compact convex corymbs of flowers of a scarlet-salmon colour, the exquisite beauty of which nothing can excel. Roxburgh, however, remarks that "it is by no means so gaudy as *I. coccinea* and *I. bandhuca* which are certainly two of our most showy Indian shrubs." In Firminger's opinion *bandhuca* does not for a moment bear comparison with it. The pallid sickly hue of the foliage often much detracts from its beauty, and the stems of plants of any age have mostly a cankered, unhealthy appearance, as though the climate did not altogether suit it. (Also considered by some to be synonymous with *I. chinensis, Lam.*)

I. undulata—Paluk-jooee.—A large ramous shrub, with large lanceolate, wavy leaves ; bears in April corymbs of numerous small white flowers, having a powerful jasmine fragrance.

I. villosa.—A large shrub, with large, lanceolate, wavy leaves as much as ten inches long ; bears in April large corymbs of white fragrant flowers, with very long tubes and very small limbs.

I. floribunda.—A new and remarkably distinct species introduced into the gardens about Calcutta ; a dwarf, bushy, pot-shrub, about a foot and-a-half high, with small smooth, lanceolate leaves, hardly two inches long ; bears during the hot and rainy seasons neat dense trusses of bright-scarlet flowers ; extremely beautiful, particularly in April, when it is perfectly loaded with blossom. Propagated by cuttings with little difficulty.

To the foregoing have of late been added : *amabillis, amboinensis, affinis, dixiana, Duches of Teck, Duffi, formosa, Lobbii, Pilgrimii, Prince of Orange, princeps, profusa, regina, sanguinea, spectabilis, speciosa*, and *Westii*.

CHIOCOCCA.

C. racemosa—SNOWBERRY.—A small shrub ; though somewhat graceful, of no great merit ; bears in May and during the hot season, pale-yellow, small inconspicuous flowers in great abundance and later white fruits. Propagated by cuttings in the rains.

PÆDERIA.

P. *fœtida.*—A remarkably pretty, slender and extensively-growing climber, bearing in October drooping festoons of small bell-flowers, purple varied with white, emitting a small so abominable as to create a perfect stench in the neighbourhood around. Propagated by layers in the rains.

HAMILTONIA.

H. azurea.—A large shrub with slender branches, apt soon to become straggling, decrepit, and unsightly, and needing, therefore, to be well cut in every year to keep it neat and in form ; bears in December great plume-like heads of very small but very bright and numerous lavender-coloured flowers, which emit for some distance around a most delightful fragrance. Easily propagated by cuttings put down in October after pruning.

H. suaveolens.—A large stout shrub, somewhat similar to the preceding, but with flowers which are nearly white, and leaves of much larger character ; blossoms from November to February with deliciously fragrant flowers, and continues for a long time a delightful ornament to the garden. Vastly improved by being well cut in after flowering. Propagated by cuttings in October after pruning.

LEPTODERMIS.

L. lanceolata.—A small shrub ; bears in September small lavender flowers of little beauty. Common in Indian gardens, and propagated by cuttings in the rains.

HAMELIA.

H. patens.—A tree-shrub of dense rich-green foliage : ornamental for its boundless profusion of sprays of orange-coloured blossoms, upon which numerous humming-birds are from morning to night for ever hopping, and inserting their little beaks into each of the short pipe-like flowers to extract the nectar. The sprays of flowers are intermingled with bunches of Pea-sized, blood-coloured berries, which, however, seldom ripen but in the cold weather, when they turn black. No plant is more easily propagated either by cuttings or by seed.

H. sphærocarpa.—A shrub of lower growth, stouter stems, with larger and more showy orange-coloured blossoms and with rich verdant leaves, much larger and thicker than those of the preceding ;

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the name assigned is apparently a misnomer, as the fruits are egg-formed, and not at all spherical. This species drops its leaves in the cold season, and the branches, at that time bare, are benefited by being cut in, when cuttings may be put down which strike readily.

PENTAS.

P. carnea.—A small herbaceous shrub, very common, but a truly beautiful plant; bears, in constant succession, Ixora-like heads of rather small, pale-lavender-coloured flowers. Easily propagated either by slips or by seed in the rains.

WENDLANDIA.

W. paniculata.—A rather large woody shrub or small tree; beras in February, in great profusion, splendid large plumes of small pure-white flowers, and is then a most beautiful object to view. Propagated by cuttings in November.

RONDELETIA.

R. odorata, syn. speciosa.—A small hard-wooded shrub about three feet high, one of the commonest, and at the same time one of the handsomest ornaments of our gardens; bears in constant succession, through the hot and rainy seasons, compact moderate-sized trusses of beautiful orange-scarlet blossoms, somewhat like miniature heads of Auricula: these, as they decay, should be removed, otherwise they remain a very long time on the plant, giving it a dirty unsightly appearance. Propagated by layers; these should be put down in the rains, and will take three or four months before they are ready for removal. Bears seed also, but rather scantily in the cold season, which some little care must be taken to secure. The best plan is to search for the berries before ripe, and tie them up in fine cloth, so that on ripening, when they open and discharge their seed, it may not be lost.

R. thyrsoidea.—Shrubs with oval soft-haired leaves, and bearing dense corymbs of small salver-shaped, rose-coloured flowers. Propagated by cuttings in November.

PORTLANDIA.

P. grandiflora—WHITE-HORSE.—Native of Jamaica, where it is common among rocks. Of this truly noble and choice shrub plants may be sometimes seen in Calcutta among the collections of the curious: three or four are to be met with in the Calcutta Botanical Gardens, which continue constantly in blossom, except during the cold season, from which, if not sheltered, they seem rather to suffer.

The character of the foliage is very handsome, of a fine rich glossy green, contrasting well with the flowers, which are as much as five inches long, resemble those of the White Lily, and diffuse during the night the same delicious fragrance. Propagated without much difficulty during the rains by cuttings in sand.

MANETTIA.

M. cordifolia.—A small plant, with slender climbing stems; requires the support of a light trellis ; grown in a pot, a beautiful ornament for the verandah during the hot and rainy seasons, when it bears in profusion its moderate-sized tubular, bright-scarlet flowers. Propagated by separation of the roots, which are of a tuberous nature or by stem-cuttings ; bears in the cold months Cucumber-like pods of seed.

CATESBAEA.

C. spinosa—Spinous Lily-Thorn.—A shrub of moderate size, with Myrtle-sized leaves : covered with large sharp thorns, hardly to be called ornamental, though when in blossom, as it is at intervals during the hot and rainy seasons, curious for the strange way in which the flowers hang from it without seeming to belong to it; they are of the size and form of a large tin extinguisher, of a pale livid-green, with the mouth, part cut into great notches; fruit seldom seen. Propagated by cuttings in the rains.

HOFFMANNIA (includes Campylobotrys and Higginsia).

A genus of very handsome-leaved shrubs, about two feet high. natives of Peru and the West Indies. They are variously known under both the names given above. They are best grown in a grass conservatory, in a light rich soil, rather free. Old mortar or concrete added to the soil gives them extra colour in the leaves. They are exceedingly lovely objects when well grown. Propagated by cuttings in sand under a glass during the rains.

H. ghiesbreghtii.—Has handsome broadly-lanceolate leaves, three to four inches long and two broad, the ribs being raised, and of a brilliant, velvety, brick-red colour. Flowers yellow, with a red spot.

H. ghiesbreghtii variegata.—Similar to the last, except that the leaves are splashed with white. *H. refulgens* is of low growth, with smaller leaves; so also is *H. ortgiesii*. *H. refulgens argyroneura* is a variegated species of No. 3; while *H. robusta* resembles No. 3 very much.

STYLOCORYNE (*Synonym*: Webera).

S. weberi.—A moderate-sized shrub, with lanceolate, polished, leathery leaves, three and-a-half inches long; bears in January and

February Ixora-like corymbs of greenish-white flowers, which emit a delightful fragrance; thrives best under shade. Propagated by cuttings in November.

RHODOSTOMA (*Synonym*: Palicourea).

R. gardenioides.—An ornamental small shrub, about two feet high, with neat and pleasing foliage; bears in March and April Ixora-like trusses of tubular, milk-white flowers, which would be very handsome if all in the truss opened at the same time instead of only a few in succession. Propagated by cuttings in the rains.

GARDENIA.

G. florida—Cape Jasmine—*Gundha-raj.*—Native of China, but common in the gardens of India : a most delightful shrub, with neat handsome glossy foliage ; leaves obovate, about an inch and-a-half long ; bears in March and April large, very double, cream-white, sweetly fragrant flowers, having much the appearance, though not the regularity of petals, of a small Camellia ; grows to six or eight feet high, but may be kept to any small and convenient size by pruning. Propagated by cuttings to any extent during the rains.

Two fine varieties of this charming shrub were introduced into the gardens of the Agri-Horticultural Society some years ago by Mr. Fortune from China, and are called by his name.

a. Distinguished by its much larger character of foliage, the leaves being full three and-a-half inches long, and by producing much finer flowers.

b. A superb variety with very large leaves and very double flowers of immense size, fully four inches across. This blossoms somewhat later in the season. Mr. Fortune says that in China it grows to ten or twelve feet in circumference. The following description of it has also been given:—"Flowers four inches in diameter, pure-white, changing to buff, not unlike a large double Camellia. It is one of the very finest shrubs in cultivation, and ranks on a level with the double-white Camellia, which it equals in the beauty of the flowers and leaves, and infinitely excels in its delicious odour."*

G. lucida.—A large shrub, or rather small tree, with rich noble foliage, the leaves being of a bright shining olive-green, firm, oval, and about six or seven inches long ; bears at intervals during the hot and rainy seasons large handsome solitary fragrant white flowers, three or more inches across ; blossoms beautifully in a dwarf condition, in which state it may easily be kept by pruning. Propagated by cuttings in the rains.

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*Botanical Register for 1846, p. 43, extracted from "Journal of the Horticultural Society."

G. radicans.—A shrub, native of Japan; bears during the hot season very fragrant white flowers.

G. Latifolia—Pâprâ.—A small tree of noble foliage, with leaves some as much as fifteen inches long and six inches wide ; bears large fragrant white, nine to eleven-lobed flowers. Dr. Roxburgh speaks in great admiration of the beauty of this tree.

G. ferox.—A stout woody shrub, about four feet high ; bears in May, when all but leafless, close groups of large, double, ill-shaped white flowers, which soon decay and look unsightly, and are succeeded by fruit-pods of the size of a Walnut. Though once in some esteem not in any respect an ornamental plant.

G. dumetorum.—A tree of moderate size ; bears in May very numerous small white flowers. Of no value from an ornamental point of view.

G. devoniensis—Native of West Africa. In Mr. Grote's garden at Alipore was a shrub of this noble plant four and-a-half-feet high, where it flowered in April ; described as bearing most beautiful flowers, very similar to those of the White Lily, with a slender tube.

G. stanleyana.—From Sierra Leone ; described as a handsome shrub with numerous spreading boughs, and large, oval, wavy, bright-green leaves ; bears numerous solitary green flowers with tube and interior of throat purple, and pure-white limb; delightfully fragrant.

G. citriodora.—From Natal ; described as a shrub about two feet high, having pointed, smooth, leaves and bearing numerous white flowers, having the form and perfume of those of the Orange.

Also *G. globosa* and *G. thunburgia.*

All of the above can be easily increased by cuttings put down in the rains.

BOUVARDIA.

A genus of small evergreen shrubs mostly introduced from Mexico. They do indifferently in sub-tropical India, and very well in glass houses on the hills. The Jasmine-like flowers are freely borne in terminal corymbs of scarlet yellow and white colours. At Coonoor, on the Nilgherries, they are reported by A. G. N. to "do splendidly and bloom the whole year through." C. G. writes from the same place, "very handsome plants and always in flowers." At Bangalore they languish owing to a dry season of about five months. Old turfy loam mixed with an equal quantity of horse manure seems to suit them. Propagate by cuttings on a hotbed.

B. humboltii crymbiflora.—A fine white-flowered plant, nicely scented.

B. jasminiflora.—Very like the above.

B. flava.—Yellow.

B. cavanillesii angustifolia and *triphylla* are red-flowered species. There are also many garden hybrids of various tints of colour.

ASPERULA.

A. odorata—Sweet Woodruff.—This will succeed on the hills where it makes a pretty plant for rockwork.

Nicholson says :—"This very pretty little plant is scentless when fresh, but, when dried, it diffuses an odour like that of spring grass, and when kept among clothes it not only imparts an agreeable perfume to them, but also preserves them from insects." Hill residents may be interested to hear on the authority of Dr. J. E. Tracy, of Kodaikanal, that *Impatiens phoenicea* possesses the same useful property as a dried herb. The species *A. orientalis* (flowers blue) and *A. tinctoria* (flowers red) should be grown in hill gardens. They can be raised from seed, and are very pretty little plants.

GUETTARDA.

G. speciosa.—A small evergreen tree at the seaside ; but often found in gardens as a large shrub. The long, tubular, pure-white flowers, produced rather thinly in axillary cymes, are deliciously fragrant, and scent the whole of a small garden, if only one or two bushes are planted. Raised by layers, which, however, take a long time to root.

MUSSAENDA.

A genus of rather large shrubs, with dense foliage of moderate-sized oval, deep dull-green leaves. From a decorative point of view, there is very little difference between the species ; during the hot and rainy seasons they are nearly always in blossom, bearing numerous corymbs of star-formed, orange-coloured flowers. From the calyces of one or two flowers in each corymb are developed large hoary-white leaves, which, contrasting with the green of the leaves, constitute principally the ornamental character of the plants. Propagated by cuttings or by seed, which they bear abundantly in the rains.

M. frondosa.—This, which has the largest flowers of any, being about an inch across, and orange-scarlet, is perhaps the most desirable species.

M. macrophylla—Has flowers about half the size of the last and of deeper colour. *M. corymbosa* has flowers much smaller still, of a pale-orange colour. *M. latifolia* and *M. luteola* differ little from the foregoing.

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CAPRIFOLIACEÆ.

DIERVILLA (*Synonym*: Weigela).

D. rosea.—A shrub which bears at the end of every little side-branch loose clusters of white and rose-coloured flowers, more than an inch long and an inch and-a-half wide ; much cultivated for its beauty in the gardens of China, and now a very common ornament in the gardens in England ; introduced by Mr. Fortune into the gardens of the Agri-Horticultural Society, but seemed quite unsuited to the climate, as the plants soon showed symptoms of decay, and before long perished. Might be tried on the hills.

LONICERA.

L. japonica—Japanese Honeysuckle.—A very rambling shrub requiring the support of a trellis or some stout posts ; leaves oval, two inches long, dull whitish-green ; bears at intervals, and nearly at all seasons, but principally in the cold weather, white (changing to yellow), strongly fragrant flowers ; a very common plant, met with in most Indian gardens. The variety *aureoreticulata* has beautiful yellow-netted leaves.

L. periclymenum—Woodbine.—A small shrub, so named in the Calcutta Botanical Gardens, but in no way resembling the common Honeysuckle of the English gardens ; a not very thriving plant, with oval leaves about an inch long, deep-green above, and hoary on the under-surface.

L. diversifolia.—A straggling, weedy-looking shrub, native of the hills of India ; flowers described as being "of a pale-buff colour, and stalkless."

L. sempervirens—Trumpet Honeysuckle—A very beautiful plant when in blossom with its scarlet scentless flowers : a common ornament of English gardens ; set down by Dr. Voigt in his Catalogue as existing and blooming here. Firminger never met with or heard of it, nor of the two following, likewise mentioned by him :—*L. macrantha*—Native of Nepal. *L. Leschenaultii*—Native of the Nilgherries. The latter is growing about Ootacamund.

ABELIA.

A. triflora.—Native of the Himalayas ; a scandent shrub, bears in great profusion dence ball-like heads of small, white, very fragrant flowers. Feathery persistent sepals form an attractive body after the flowers have fallen.

VIBURNUM.

V. macrocephalum, Syn. V. Fortunei—Leaves ovate and scabrous ; flowers large.

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V. dilatatum.—Described by Mr. Fortune as "a fine new Guelder's Rose"; and introduced by him, together with the last, from China into gardens of the Agri-Horticultural Society; both perished, seemingly unsuited to the climate. *V. Opulas*—Guelder Rose—is down in the Ootacamund list.

CORNACEÆ.

AUCUBA.

A. japonica.—This fine mottle-leaved shrub, so familiar in English gardens, can only with great difficulty be kept alive in the plains. A specimen or two in a small pot is all that one sees in this country. It does very fairly in the grass conservatory, and on the hills it can be successfully cultivated.

ARALIACEÆ.

The plant of this Order suited for the garden are ornamental solely for their foliage, not bearing flowers worthy of notice. They are all easily propagated by cuttings in the rains.

HEDERA.

H. helix—Common Ivy.—Manages to exist as a small pot-plant but makes little growth and, except for association, is unworthy of a place in the garden. It is common enough on the hills, where it grows in a wild state.

Variegated Ivy has now made its appearance in hill gardens, where it should do well.

PANAX.

A genus of ornamental-leaved plants which have become very popular for decorative purposes in recent years. They are evergreen and afford a refreshing contrast by the light green of their leaves. Almost any soil suits them, and they are easily propagated by cuttings and division of roots during the rains.

P. cochleatum.—Is an old variety, the leaves resembling shallow sauce-ladles. *P. fruticesum* has rather ornamental foliage, being dense and split; is an old favourite. The following are late introductions and are remarkable for the handsome variegated finely-divided character of their foliage:—*falicifolium*; *laciniatum*; *Massangiana*; *plumatum*. The following are also ornamental leaved, and are much cultivated:—*Bausei*; *elegans*; *Gordonii*; *obtusum*; *rotondus*; *serratifolia*; *Shepherdiana*; *Veitchii*; *Victoriae*.

The variegated forms with finely cut leaves are exceedingly useful for temporary indoor decoration. Banked with Ferns and other foliage plants they have a beautiful effect. Well suited for the plains of India.

ARALIA.

These are closely allied to Panax ; indeed, some of the varieties are hardly distinguishable from them ; while others are entirely dissimilar.

Their cultivation is the same as that for Panax.

A. papyrifera—RICE-PAPER PLANT.—Bears a strong resemblance to the Castor-oil plant. Its only interest lies in the fact that the pith of the flower stems yields the true rice-paper of the Chinese. Propagated by the suckers it throws up for some distance around ; also by seed, which it produces in great abundance.

The following are eminently ornamental, with peltate leaves, finely divided, and of a dark glossy green :—*A. Chabrieri* ; *Veitchii*, *Veitchii gracillinea* ; *elegantissima* ; *Reginae*. The following are also a highly ornamental character :—*Bemaysiana* ; *filicifolia* ; *gracillinea* ; *Guilfoylei*; *Kerchoveana* ; *leptophylla* ; *maculata* ; *monstrosa* ; *nobilis* ; *parasitica* ; *quercifolia* ; *reticulata* ; *rotunda* ; *spectabilis* ; *spinulosa*; and *sonchifolia*. Some of the foregoing are of large growth ; these it would be advisable to grow in the open border. Others again are of dwarf growth, and such had best be cultivated in pots, and kept in the grass conservatory.

UMBELLIFERÆ.

DIDISCUS (*Synonym*: Trachymene).

D. caerdlens.—Singular as being the only annual of an ornamental character that this vast Order contains ; bears umbels of beautiful azure flowers, flat at first, and becoming semi-spherical afterwards. Sow the seed in October on the plains, and in March on the hills, and put out the plants when two inches high in a good soil in the border. If grown in pots, it is benefited by frequent siftings ; blossoms in April on the plains.

FICOIDEÆ.

MESEMBRYANTHEMUM.

Fig-Marigold.

Dwarf succulent plants. *M. tricolr* (*Syn. M. pyropeum*) bears somewhat small, Daisy-formed, crimson and white flowers of dazzling beauty, which open only in full sunshine : *cordifolium* purple and *pomeridianum* large brilliant yellow flowers. Show the seed in

October on the plains, and in March on the hills, in wide shallow pans filled with good soil below, but very sandy just on the surface. A pane of glass laid on the pan will tend to keep the soil moist till the seeds germinate.

M. cristallinum—THE ICE PLANT.—A native of the Canary Islands. Remarkable chiefly on account of its large fleshy leaves, having the appearance of frosted glass. Sow in October on the plains in March on the hills.

Mesembryanthemum plants need well-drained soil, composed of light sandy loam, mixed with potsherds or bricks broken small. The plants may be propagated by cuttings as well as seed. The cuttings, like those of most succulents, should be dried in the sun for a day or two before planting.

CACTACEÆ.

This extraordinary family of succulent plants belongs, with the possible exception of Rhipsalis, exclusively to America. From America, however, at divers times and in divers manners, various species have been spread all over the tropical and sub-tropical regions of the globe and are now common plants of the jungle in such countries. In India, for example, there are several species of Opuntia (Prickly Pear) very common, the history of whose introduction is fairly well known. In Australia, the Opuntias are a very serious pest. In South Africa and in the arid districts of North Africa Cacti are found. The largest Cacti in the world are found, however, in their original home in Mexico. Such forms are the pillar Cacti, like *Cereus Weberi*. In America, England and the Continent there have always been fanciers of Cacti, just as there are fanciers of Roses. Sweet Peas, and Carnations. The variety of bizarre forms makes this group a most attractive one ; and in many cases the flowers are of a brilliant colour. The difficulties attending the cultivation of this order in England do not occur in the plains in India. The only places in India, where these plants cannot be successfully grown out of doors are where frost would kill them or excessive rainfall rot them. The Cacti are naturally inhabitants of arid deserts and must have conditions similar to those of their native environment. Such conditions are a loose (but rich) soil, dry atmosphere, and moderate watering. Drainage is all-essential, and hence it is desirable to grow the plants in a mixture of sandy loam, leaf mould, and plenty of gravel of a fairly large size. The plants are propagated in many cases by seeds, and in all cases by stem cuttings. These, after being taken from the plant, should be allowed to dry in the sun for a day or two. This heals up the cut end of the cutting and prevents the very watery tissues from rotting.

The peculiar form of the Cacti is due to the fact that they have discarded their leaves, and have given their stems the triple function of stems, leaves, and water reservoirs. Most of the plants are protected by spines, which are transformed leaves or stems. This protection one can imagine to be very necessary for the only large plant in a desert area. Without such protection the plants would soon be eaten up by wandering and famished animals. In many cases the plant tissue is exceedingly mucilaginous, another device for the retention of water. Spineless Cacti have been developed by Burbank in America and used for the feeding of stock in arid districts. The common prickly pear of the Bombay Presidency (*Opuntia elatior*), after having its spines burned off by a gasoline torch, has proved a useful famine ration for cattle when mixed with a proper proportion of dry rough fodder. The fruits of this plant are eaten by the Deccani herd-boys, just as the *tuna* fruits are eaten in Mexico and Italy. The following are some of the most important Cacti.

MELOCACTUS.

TURK'S-CAP, OR MELON-SHAPED CACTUS.

A name significant of the form of the plants, which produce their flowers on a head covered with dense wooly and bristly hairs. *M. erectus* is in the Calcutta Botanical Gardens. Others noted as most worthy of cultivation are :—*M. depressus ; Grengelii ; macrocanthus ; polycanthus ; pyramidalis ; Sellewii.*

MAMMILLARIA.

NIPPLE CACTUS.

Described as "dwarf plants composed of an assemblage of tubercles somewhat resembling the teats of animals. These are generally terminated with bunches of hairy bristles, and between them the flowers appear." * The few that our gardens contain are :

M. tenuis.—Pretty and delicate-looking from its club-like lobes being hoary with bristles. Suited to a pot of about the size of a teacup. Flowers described as pale yellow.

M. pusilla.—Resembles a little heap of balls of worsted flowers described as pale red.

M. longimamma.—Lobes or tubercles long and thin, like a man's little finger ; quite smooth, surmounted with a starry head of bristles. The flowers are described as "produced on the summits of the stems, and the largest and most beautiful of any of the genus, opening in the sun ; the interior divisions of a brilliant yellow, the exterior reddish." †

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* "Cottage Gardener's Dictionary." † "Le Bou Jardinier," pour 1866, p. 567.

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Others mentioned of special merit are :—*M. atrata ; Anderaea, carnea ; cirrhifera, spins fuscis ; coronaria ; depressa ; fulvispina ; Karwinskii ; magnimamma ; quadrispina ; sphacelata, Wildiana.*

ECHINOCACTUS.

HEDGEHOG-THISTLE.

Curiously prickly globular-formed plants.

E. echidne.—Of curious growth, resembling a ribbed Melon, of the size of a cricket ball, with star-like arrangements of thorns along the ribs ; bears in February pretty delicate, pinkish-white flowers of the size of a Daisy, and somewhat like those of a *Mesembryanthemum*, in little groups near the summit of the plant.

D. multiplex.—Described as bearing flowers of a delicate flesh colour, as large as the plant itself, which is of a balloon form. In the Botanical Gardens are likewise—*E. Williamsii* ; *E. hexaedrophorus* ; *E. notophorus* ; *E. platycerus* ; *E. Eyresii.* Mentioned also as especially deserving of cultivation are :—*E. echinatus ; densus ; Gilliesii ; imbricatus ; latispinus ; Mackieanus ; montevidensis ; parvispinus ; platyacanthus ; scope; spinis; albis subgibbosus; tenuispinus ; tubiflorus.*

CEREUS.

TORCH-THISTLE.

Curious thorny, long-stemmed, strong-growing plants, demanding very little care in their cultivation. The soil best adapted for them is a mixture of vegetable mould and decayed cowdung, well intermixed with crocks and broken bricks.

C. eriophorus.—A climbing plant, curious for the woolly kind of substance with which the stems are covered.

C. grandiflorus—Night Flowering Cereus.—Mr. Gosse writes :—"The magnificent flowers are seldom seen. The plant seems a shy bloomer. In order to see it in perfection, one must see it open at midnight. Cut a few inches of the stem on each side of the maturing bud and bring within doors. Soon after dark it begins to open, and towards midnight expands its noble beauty ; a disk six inches in diameter, very double, pure-white in centre, exterior yellow-brown, most deliciously fragrant of Clove perfume. In the morning beauty and fragrance are gone." In this country it is neither a rare plant nor a shy bloomer, but from the immense size to which it grows is only admissible in a garden of great extent. Its flowers may be witnessed in perfection at daybreak and for some little time after. The flowers, it is said, may be preserved in full beauty for a long time if the pistil be removed before impregnation.

C. speciosissimus.—This also, seen in the night, when in full blossom, is said to be an object of almost unrivalled splendour.

C. nycticalus.—A climber, requiring an extensive kind of support for its thin long-jointed stems, which throw out numerous fibrous roots, whereby it adheres to a wall or trunk of a tree, against which it may be planted ; bears in May very large white flowers, which open in the night and perish at the dawn.

C. hexagonus.—A very common plant of the size of a large shrub, with stout six-ribbed stems ; bears during the rains a succession of numerous large white flowers in the night-time, which perish soon after daylight.

The names of others found in our gardens, but calling for no particular description, are :—*C. triangularis* a climber, very common ; *C. tetragonus* ; *C. bonplandi*; *C. Jamaicensis* ; *C. loranthoides* · *C. multangularis.*

EPIPHYLLUM.

A genus of plants with stems resembling a combination of irregular edged straps of ribbons growing out of each other in succession.

E. hookeri.—A plant of considerable size, requiring a large pot : grows very rapidly, and is apt to let droop its long, flat stems over the ground and look very untidy ; bears during the hot and rainy seasons numerous very large star-formed, white flowers, comprising very many long narrow petals. These open in the evening and perish the following morning. At Ferozepore Firminger had plants which throve vigorously and grew to a great and unmanageable size, but never blossomed, which is surprising, as the plant blossoms so freely in Bengal.

E. trancatum.—This, of which we possess three varieties, bears in the cold weather large gorgeous flowers of a clear bright pink or rose colour, which, unlike those of so many of the Order, have the merit of displaying their beauty in the day time. A very delicate and fragile plant, soon broken to pieces if not sheltered from the wind or any rough treatment ; thrives in a soil of silver sand with the admixture of a little vegetable mould. The largest specimens will not require a pot of larger size than a sugar-basin, which for safety's sake it is well to insert in a larger pot filled entirely with crocks, where on the drooping fragile stems may rest without fear of rotting. From its delicate habit it requires to be kept in the shade, but possibly a certain amount of exposure to the morning sun would be beneficial. Any small piece broken off and inserted in the soil will take root. But Sir J. Paxton says : "To obtain young specimens, keep a little damp moss round any of the branches and roots will speedily be found at the place." In England, as a matter of curiosity, it has sometimes been grafted upon *Pereskia.* A young stem of the latter has its head cut off and small slit made. In this the flat stem of the *Epiphyllum* is inserted and the graft tied round with a little moss. It is often grafted successfully on *Cereus grandiflorus*.

E. alatum.—A plant similar to, but of stouter habit than the preceding. Flowers said to be white.

RHIPSALIS.

R. salicornoides.—A curious plant, with short-jointed stems growing successively upon each other like small pieces of tobacco-pipe united. Flowers small, yellow, and in no way interesting. In its native locality it is epiphytal; the growing of it in pots is probably the cause of its being as shy of blooming as it is sometimes reported to be.

OPUNTIA.

PRICKLY PEAR.

There are several species of this genus of singular plants, which produce their large oval-formed, thick flat leaves, one from the edge of the other, and are usually covered with star-like arrangements of sharp bristles. Most bear large yellow or reddish flowers.

According to Burkill * the following Opuntias are now wild in India:—

O. cochinelifera.—with exerted stamens.

O. monacantha, with one long prominent spine from each cushion.

O. nigricans, spines tawny to black, flowers orange.

O. elatior, spines tawny to black, flowers lemon yellow changing to rose pink. The common plant of the Bombay Deccan.

O. dillenii.—Some spines curved, all light horn coloured. This is the only species mentioned in Hooker's Flora Indica, and, until recently, all Opuntias in India were erroneously put in this species by both amateur and professional botanists. There is also a spineless variety called *Opuntia decumana* which is quite decorative and is also a valuable famine fodder for cattle. It is reported from Poona and Coimbatore, but is probably found elsewhere also.

These plants are useful for rocky compounds in dry districts. A good-sized hole must be dug and filled with light soil and plenty of leaf-mould. If kept pruned down to a reasonable size they are

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* Records of the Botanical Survey of India, IV, 6. Determinations of Prickly Pear, now wide in India, by I. H. Burkill.

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much better than nothing in a very dry area, especially if reinforced by variegated Agaves, Aloes, Yuccas, etc.

PERESKIA.

P. bleo—Barbadoes Gooseberry.—A large spreading shrubby plant, with cylindrical stems covered with long needle-like spines, and, unlike most plants of the Order, bearing abundance of leaves. Flowers very pretty, resembling small single pink Roses; nearly always in blossom.

P. aculeata.—In general appearance much resembling the foregoing, but a smaller plant. Dr. Voigt stated that this species blossoms in Bombay, but not here, and in England very seldom. Flowers white.

BEGONIACEÆ.

BENGONIA.

ELEPHANT'S EAR

A very extensive genus of handsome-leaved plants, distributed over a wide area. Many of the most beautiful species are natives of the Eastern Himalayas, extending as far as Simla. In Sikkim, the Khassya mountains, the valleys of Darjeeling, and in Assam many very beautiful varieties have been found and brought under cultivation. Many fine species have been introduced from tropical South America, especially Brazil. But by far the greatest number of our cultivated varieties, which are remarkable for the exceeding beauty of their leaves, have been raised by hybridization.

In England and on the Continent, Begonias are divided into three distinct groups: (1) Those remarkable chiefly for the beauty of their leaves, the flowers of which are insignificant, and therefore of no account; (2) the handsome large-flowered varieties, in which the leaves are mostly plain and of no account; and (3) the tuberous rooted flowering varieties; which are very similar to the last, except that they have tuberous roots. The two last named are not found to grow to perfection on the plains; but succeed remarkably well on the hills, where indeed the other—the ornamental-leaved varieties—also come to great perfection. The first named succeed admirably, in our grass conservatories, even under the shelter of a verandah, and are the ones most generally cultivated on the plains. Those varieties from Sikkim, the Khassyas, Darjeeling and Assam also grow luxuriantly in grass conservatories.

To grow Begonias to perfection, a porous soil is absolutely necessary: Their roots are exceedingly fine and delicate, and *remain mostly on the surface.* This fact should be borne in mind. Long exposure to rain destroys all tuberous-rooted Begonias. The best way is to fill a pot half full of crocks for drainage; then fill in with a soil composed of well-decayed leaf-mould and river sand in equal parts, with sufficient old mortar or concrete broken to the size of Hazel-nuts, to render the soil porous. In this plant the Begonia, and place round it large pieces of old mortar, so that the leaves will rest on them, and not touch the soil. Treated in this way they will come to great perfection. Begonias are admirably suited for hanging baskets, intermixed with Ferns, Cyrtodeiras, and other dwarf foliage plants; while for rockeries they are unrivalled. They are impatient of too much moisture round the roots; hence the importance of very thorough drainage.

They are very easy of propagation cuttings strike most readily while a single leaf imbedded in pure sand kept well watered, and covered with a bell-glass, will yield two or three plants. It is also possible to propagate from a cutting of a leaf containing a vein junction, which part is inserted in the soil. The best time to propagate is during the rains, when a large stock of plants may be raised.

There are over two hundred varieties in cultivation of all classes. The following were fully described in the last edition of this work, and being favourites still, they have been allowed to stand :—

B. argyrostigma.—A small, remarkably handsome plant ; leaves on the upper surface of a dark bright green, distinctly dotted over with numerous spots of silver ; and underneath of a flesh or dull-red colour : bears in April greenish-white flowers of moderate size. It is principally the lowermost leaves that are most marked with silver spots ; when the plant is growing with much vigour, the uppermost ones often lose them altogether.

B. hydrocatylifolia.—A very pretty species, with thick succulent scaly stems, which lie prostrate upon the earth, concealed beneath the abundance of handsome foliage of kidney-formed polished-green leaves of moderate size, prettily clouded with the markings of the nerves showing black. The under-surface of the leaf of a pale Indian-red colour ; sends up in February slender flower-stems of the thickness of a tobacco-pipe, bearing a profusion of middling sized pretty, delicate, rose-coloured flowers.

B. hydrocotylifolia. var. *manicata.*—A remarkably handsome plant, and a delightful decoration to the verandah: habit the same as that of the above ; but with much thicker stems, and leaves full four times as large, with the markings of the veins white both on the upper and under surface, supported upon long brittle footstalks. An object of especial beauty when in full blossom, with its numerous pretty flesh-coloured flowers.

The leaves have a great tendency to rot with the wet; and the plant seems to thrive the better for being left unwatered for long intervals of time. Most easily propagated. A single leaf with its footstalk broken short off, with its heel, at the stem, and inserted in sand with a handglass over it, will, in a very short time, become a rooted plant. In this way Firminger in about eight months from a single leaf produced a plant of the largest growth.

B. malabarica.—A plant about fifteen inches high with elliptical, pointed leaves, five inches long, of a rich polished green, rendered uneven by their numerous hair-bearing pimples; blossoms in March.

B. nitida.—A small plant; beautiful for the brilliant freshness of its pure green leaves : apt to die down in the rains, but on the approach of the cold season springs up again and recovers itself; bears livid white flowers of middling size.

B. humilis.—A small insignificant plant, with much of the character of *B. malabarica*; bears small insignificant flowers; little better than a mere weed.

B. platanifolia.—A plant about two feet in height, with very handsome leaves, like those of the Plane-tree; bears in November rather large pretty white flowers; exists apparently in this climate with some difficulty, as it is rarely seen but in a sickly, unthriving condition.

B. reniformis.—A very handsome plant : very hardy; will thrive well in a shady place in the border and grow vigorously to as much as three or four feet in height. Flowers very small but in immense number in large, dense, silvery heads, which contrast most beautifully with the rich pure green of the angular-edged leaves; as do likewise the pendulous bunches of white seed-vessels which succeed them.

B. fuchsioides.—A small plant of singular beauty; not uncommon at Ootacamund, whence Firminger brought down plants to Howrah, but they lived only a very short time; bears drooping bunches of bright red flowers, similar to those of the Fuchsia, for which it might be easily mistaken at a short distance.

B. longipila.—Native of Mexico; found in some of the Calcutta collections; a handsome species, with prostrate stems and large leaves, covered with long hairs, and deeply cut like those of the Castor-oil plants, of a dead-blackish-green, prettily marked with clear green along the nerves; described as bearing clusters of numerous large rosy-white flowers.

B. rex.—One of the commonest of our ornamental-leaved varieties, and the parent of a great many hybrids. Thrives to perfection in grass conservatories.

B. corallina.—This is distinctly one of the best of the shrubby class from Brazil. Attains a height of 8—10 feet. Leaves large dull-green. Flowers bright, coral-red, in ample drooping panicles. Very effective.

B. maculata.—Differs but little from the last named, except that the leaves are white spotted, and the flowers smaller.

B. rubro-venia.—A small plant of recent introduction into our gardens, where it thrives well in the grass conservatory. Leaves oval, pointed; the upper surface mealy-white, except the veins, which are dark-green; under-surface and stems deep red.

The following are other handsome varieties:—*Annica*; *argentea*; *Count Alfred*; *Lemange; Diadema Gogoensis; Imperialis; Isadora Leroy Jacksonii; La Perle de Paris; Le Shah: Lowii; Madame H. Gache; Marshalli*; *Marquis de Nadaillac; Moonlight; Mrs. Larmour; Alba; Pearl; Prince of Wales ; Queen Victoria; Sikkimensis variegata ; Splendens ; Starlight Thomsonii; White Queen; Zointhiana* and some of the unnamed Singapore, Chittagong, and Sikkim varieties. *President Carnot* is a new plant of great beauty.

CUCURBITACEÆ.

Only a few of these climbers, so useful in other respects, are of ornamental merit except for the striking appearance of their fruit, of which a description is given elsewhere.

TRICHOSANTHES.

T. palmata.—Climbing over the highest trees, this coarse-looking plant is only observed when its beautiful scarlet fruit, the size of a goose's egg, is displayed overhead. But although so tempting to look at, the fruit is said to be a deadly poison.

MOMORDICA.

M. charantia.—A jungle creeper bearing Ivy-like leaves and an exceedingly bright orange-yellow flower; is well worth a place in the garden. The species *dioica* and *balsamina* are also attractive.

CEPHALANDRA.

C. indica and its variety *palmata*, with pure white campanulate flowers, are often seen in gardens. Easily raised from seed.

PASSIFLORÆ.

PASSIFLORA.

PASSION-FLOWER.

The different species of Passion-flower met with in our Indian gardens are rather numerous. Many, however, seem little disposed to bloom; and some five or six, perhaps, the flowers of which are of exquisite beauty, are as many as are of any value in an ornamental point of view. They are tendril-bearing climbers; natives principally of South America and the West Indies, and require a trellis for their support. "They grow," it is said, "with great rapidity; but soon exhaust the soil, and thus become injurious to plants in their neighbourhood; whether therefore grown in pots or in the open ground, they require often a new soil. The branches should be cut in closely each year after flowering."* It is therefore necessary to plant them in a rich soil. They produce their flowers upon the wood of the current year; and Sir J. Paxton recommends that they should be pruned in the manner of a Vine; that is, that the stems should be shortened to two or three eyes off the old wood. He states, moreover, as also does Mackintosh,† the curious fact, that left to themselves they are shy of setting fruit; but that they do so readily when impregnated with the pollen of other species in preference to their own. *P. racemosa* does so with pollen of *P. alata.* Nearly all are easily propagated by cuttings and layers.

P. alba.—Flowers very fragrant, with calyx and petals crimson; rays variegated white, purple, and crimson. A very shy bloomer.

P. caerulea.—The most common, and certainly one of the handsomest of all; a very stout, extensively growing plant, with bright three-lobed leaves, covering a great space of wall or trellis; bears abundantly during the rainy season large flowers with the segments of the calyx and petals pale greenish-white; styles purplish; rays of the crown purple at the bottom, white in the middle, blue at the end. Most readily propagated by the numerous young suckers it sends up for a great distance round the spot where it grows.

P. caerulea-racemosa.—A hybrid between the two species whose names it bears; flowers very large and handsome, though not very brilliant, being of a pale lilac colour, prettily relieved with a pure white crown of rays. Cultivated in a large pot, it continues constantly in bloom. It should be re-potted with fresh soil annually in the cold weather.

P. edulis.—Flowers described as white fringed with purple, fragrant, but of no great beauty.

P. foetida.—A plant of slender habit; flowers small, white, and unpretending. Ornamental for its delicate and densely growing foliage, which, when bruised, emits a very sickly disagreeable smell. Bears fruit abundantly, resembling small green Gooseberries.

P. gontierii.—A hybrid variety which bears flowers hardly to be distinguished from those of *P. middletoniana.*

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* "L. Bon. Jardiniar" 1866 p. 636. † "Greenhouse" p. 104.

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P. holosericea.—An extensive climber : leaves, formed of three blunt lobes, pretty for the marking of their dull-red veins. Flowers of a tawny colour, not very large, but borne in great profusion, having a strong smell of honey.

P. incarnata.—Described as "a pretty thing of semi-herbaceous habit ; flowers pink."

P. kermesina (*syn. P. raddiana*).—A slender-stemmed, extensive climber, with three-lobed leaves having large ear-like stipules. Flowers of moderate size, of a fine carmine crimson, display themselves only where sheltered from the sun. A common plant in the gardens about Calcutta, where it blossoms almost perpetually through the hot and rainy seasons. Sir J. Paxton says it, "beyond all comparison the most beautiful species in cultivation except *P. racemosa.*"

P. laurifolia.—A powerful, extensive, and rampant climber, with dence handsome foliage, of rich-green, glossy, laurel-like leaves, and fine large blue fragrant flowers.

P. lunata.—A most extensive climber, remarkable for its curious crescent-formed leaves ; bears constantly in great profusion flowers of moderate size. Of no great merit.

A. middletoniana.—A handsome species with five red-and green three-lobed leaves ; bears in May very large, exquisitely beautiful flowers, bright azure-blue with rings of pure white, and of a fine fragrance.

P. minima—Flowers small and insignificant, succeeded by dark-blue berries, much like sloes : a mere weed.

P. punctata (*syn. P. tuberosa*).—Bears greenish-white flowers of moderate size, and is only interesting for its foliage of curious two-pronged leaves.

P. quadrangularis.—Mentioned as "a superb species with flowers of a most superb colour." A strong woody climber, with stout quadrangular stem and large heart-shaped leaves, seven or eight inches across ; not uncommon in the gardens about Calcutta, where it blossoms during the rains. Sir J. Paxton says that in France it is grafted upon *P. caerulea*, and flowers and fruits the same season as grafted, when not above two feet high. The granadilla.

P. recemosa.—This very choice and handsome plant bears deep-red or scarlet flowers in March. It thrives very indifferently in this climates, and can only be propagated by grafting upon a stronger species.

P. rotundifolia.—Bears pale-green insignificant flowers ; an uninteresting plant.

P. serratifolia.—Bears in May large, very handsome, lavender-coloured flowers.

P. vitifolia—Vine-Leaved.—This is one of the best, with large orange-crimson flowers ; lasting for a long time. Raised from layers.

P. leschenaultii.—An indigenous trailer, having simple slightly three-lobed leaves nearly as broad as long. Flower white.

To these have of late been added, *P. trifasciata mutabilis, macrocarpa, Harrisiana, Modonna, Imperatrice Eugenie; Comtesse Ginglini, Constance Elliott,* and *fulgens. P. trifasciata* is remarkable for its handsome foliage which forms a conspicuous object in the plant-house when trained up the supports.

MURUCUJA.

M. ocellata.—A most ornamental climbing shrub, native of the West Indies, beautiful, if only for its very handsome curtain of foliage, which entirely conceals whatever support it is trained to with its densely-crowded, curious, transversely-oval leaves ; bears during the whole of the cold months a profusion of beautiful crimson flowers of moderate size, much like those of the Passion-flowers ; succeeded by a crop of small purple berries. Propagated by layers and seed, the latter sown in February.

TACSONIA.

A genus of climbing plants in most respects very similar to the Passion-flower ; but not, perhaps, so handsome. They are not found to grow satisfactorily in the plains of India.

T. pinnatistipula.—Plants of this species were introduced into the Calcutta Botanical Gardens, but, Firminger says, soon died off. *T. Van Volxemii,* with handsome scarlet flowers and *T. tubiflora alba* with white flowers, both do on the hills.

P. mollissima.—This thrives well, and produces fruit abundantly at Ootacamund, whence plants brought down to Calcutta soon perished. *T. Exoniensis* is, perhaps, the only variety that does well in the plains.

ONAGRACEÆ.

JUSSIAEA.

J. villosa—Primrose Willow.—Native of India. A shrubby herbaceous plant, two or three feet high ; bears rather large, four-petalled, evening-primrose-like flowers, of a pale dull-yellow colour, not very ornamental. Propagated from seed, which it bears in abundance.

J. repens.—A floating aquatic plant with pale yellow flowers. Found in still water all over the plains.

TRAPA.

T. bispinosa—The Water Chestnut.—Abundantly found in the Cashmere lakes. Grown also in tanks in Gujerat in the Bombay Presidency.

The nuts are a well-known article of food.

FUCHSIA.

No plant of this genus has ever been found able to survive beyond the commencement of the hot season on the plains. Specimens have occasionally been shown in Calcutta blossoming in the cold weather, but these have, it is believed, been brought down just at the close of the rains from the hills.

It is however, cultivated with the greatest success on the hills, where it forms one of the chief ornaments of the garden and the glass-house. The method of cultivation adopted is to secure, say in October, a good collection of plants. As the winter advances the pots containing them should be plunged into the ground, and protected from the snow by portable glazed frames ; if these are not available, under some other shelter, so long as they are protected. They must be just kept alive by watering very sparingly. About the end of February, when the snow has ceased, the pots containing the plants should be taken up, and the plants pruned, turned out of their pots, and re-potted into fresh soil, made up of leaf-mould, sand and loam. They should now be watered more liberally, for they will be making their new growth. The plants should be kept under shelter until the weather becomes perceptibly warmer, when they may be exposed to the sun and air. Frequent applications of liquid manure and soap suds will benefit them immensely. They will bloom in great profusion from April to September.

They are very easily propagated by cuttings put down at any time from March to September and every slip will strike if put down in pure sand with bottom heat. The plants may also be propagated by planting the suckers that grow from the base of older plants. These should be "stopped," i.e., the tops pinched off, when a growth of three or four joints has been made in order to encourage side branching. Of the side branches one should be selected as the main stem of the adult plant and the others stopped. Fuchsias must be kept within reasonable size and in good symmetry by frequent pinching of shoots.

They can be grown at hill stations where the temperature never falls to freezing, *e.g.*, Mahabaleshwar, Coonoor and Panchgani.

The number of varieties in cultivation is very considerable ; and it is therefore needless to give a detailed list here. New varieties are being constantly imported by amateurs and others on the hills, and

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the best way to secure a good collection is to attend auction sales of plants, which are very frequent on hill stations, when really fine varieties may be obtained at a trifling cost, or cuttings may be purchased from some of the public gardens or private nurserymen. After futile attempts to grow these beautiful plants on the plains (a hopeless task) it is refreshing to find hedges of them at hill stations. But the latest improved varieties, especially the doubles are by no means common, and hill-growers might well improve their collections. Varieties such as Madam Carnot, Mrs. E. G. Hill Princess May, Royal purple, Vesta, Countess of Aberdeen, Gipsy Queen, Miss Lucy Tinnis and many others have truly magnificent flowers.

EPILOBIUM.

E. augustifolium—Rose Bay, or French Willow.—A hurdy shrub of 4—6 feet, confined to the hills, where it is apt to spread rapidly in the shrubbery.

It is, however, an attractive plant with pretty crimson flowers in terminal spikes or recemes. Easily propagated by division.

OENOTHERA.

EVENING PRIMROSE.

The most beautiful plants of this genus are perennials.

OE. Drummondi—Evening Primrose.—A very showy and beautiful species, and a charming ornament to the garden ; bears throughout the hot and rainy seasons, a constant succession of large bright-yellow blossoms, which are open not only in the evening, but continue so during a great part of the day ; though perennial, it is best renewed from seed yearly in October.

OE. tetraptera.—A plant of prostrate growth, pleasing for the profusion of large white blossoms it opens in the evening. Sow the seed in October ; it reproduces itself by drooping its seed.

OE. bistorta.—A weedy plant ; bears small, yellow flowers.

OE. bistorta veitchi.—Has yellow flowers with crimson spots.

OE. Drummondi nana.—Flowers bright yellow and large. Plant dwarf and suitable for rock gardens.

OE. rosea.—Flowers small, rose-coloured.

OE. speciosa.—White flowered.

GODETIA.

Veary beautiful annuals, producing flowers larger than a rupee, of every shade of blush and rose colour, with a dark stain on each petal. Sow in October on the plains, and in March on the hills.

To be effective they are best grown in clumps. They comprise *G. Lindleyana* of which there is a double variety ; *G. rubicunda*, of which the variety "Bride" is eminently pretty ; and *G. roseo-alba*, blush ; *G. Duchess or Albany* beautiful, large, white flowers, four inches across ; *G. Lady Albemarle*, carmine ; Marchioness of Salisbury, large, rosy-crimson and Lady-bird, pearly-white.

CLARKIA.

The Clarkia is a flower that has been considerably developed by European flower breeders. There are two groups of florist's varieties, the *Elegans* and *Pulchella* groups, developed from species of these names. The general colour of the flowers is some shade of red or purple. Pure whites are also produced, and double varieties are offered by seedsmen. The genus belongs to W. N. America and like warm, well drained, sunny situations. The plants are easily propagated by seed as cold weather plants, on the plains and summer plants on the hills. They benefit immensely by pinching back to produce bushy plants.

EUCHARIDIUM.

E. concinnum.—A pretty, unpretending plant ; bears pink flowers, very similar to those of Clarkia. Sow in October.

LOPEZIA.

L. coronata.—A rather insignificant annual ; bears curious small rose-coloured flowers.

GAURA.

G. Lindheimeri.—When first in blossom a very pretty annual bearing spikes of rather large milk-white flowers ; on becoming older the plant loses much of its beauty by the spikes becoming longer and the flowers more scattered upon it. Sow in October, and plant out in the border in good soil.

LOASACEÆ.

BARTONIA.

B. aurea—Golden Bartonia.—A very beautiful annual, opening in large, yellow Buttercup-like flowers in a situation where fully exposed to the sunshine. It requires a very rich soil and abundance of water, in the administering of which caution must be taken that too much moisture does not lie round the collar of the stem, or the plants are very apt to rot off just when about coming into bloom

Sow the seed in October, and put out the plants in the border when two inches high.

LOASA.

Creepers ; having leaves which when touched sting like nettles ; the flowers they bear are more curious than beautiful.

L. aurantiaca.—Bears orange-coloured flowers.

L. nitida.—Bears yellow and red flowers. Sow the seed in October on the plains, and almost any time on the hills.

LYTHRACEÆ.

PUNICA.

P. granatum.—*Fl. Pl.*—The Double-Flowered Pomegranate—*Anar.*—The splendid large vermilion-coloured blossoms of this shrub render it a fine ornament, especially in a large garden, when seen from a distance. The shrub itself independent of its flowers, is not particularly attractive and, without attention given to the pruning of it, becomes very straggling and unsightly. Sir J. Paxton says, "All flowers are produced at the extremities of the young branches from the same year ; cut away, therefore, all the weak branches of the former year, and shorten others according to their strength." Propagated by suckers.

P. nana—The Dwarf Double-Flowered Pomegranate.—A pretty pot-shrub about a foot in height ; a great improvement upon the preceding, of which Mrs. London says, without doubt it is only a variety. There is said to be likewise a double white variety. The latter is not uncommon in public gardens.

CUPHEA.

C. purpurea—Cigar Flower.—When grown in good, rich soil, a beautiful little annual ; bears its pretty fringed pink, purple, and crimson flowers, somewhat like those of Lagerstroemia, three or four weeks from the time of sowing. As the plants decay, fresh ones from self-sown seeds almost immediately supple their place in continued succession for a great length of time. *C. procumbens*, *C. Hookeriana* and *C. miniata* are good plants.

C. platycentra—A scanty, mean-looking shrub three feet high with small ovate leaves ; flowers small, irregular shaped, pale, dull-red with two purple-black, heart-shaped, erect lappets.

LYTHRUM.

LOOSESTRIFE.

L. Graefferi—An ornamental trailing herb which keeps in flower for a long time. Flowers cymose, pink. Good for rockwork and hanging baskets. Suitable for the hills. *L. roseum* is also pretty. Easily propagated from seed and by division.

HEIMIA.

H. myrtifolia.—A small, low, slender, unpretending shrub ; bears in May numerous small, yellow, uninteresting flowers.

GINORIA.

G. americana.—A rather pretty shrub, three or four feet high, with small Myrtle-like leaves ; bears during the hot and rainy seasons pretty, moderate-sized purple flowers, succeeded in the cold weather by small, shining, dark purple berries.

GRISLEA.

G. tomentosa—Dharee—Dhao.—A large shrub, or rather small tree, eight or ten feet high, with drooping branches, and rather coarse-looking foliage, but very handsome when in full blossom in February and March, presenting the appearance of a perfect shower of dazzling red, with its infinitude of small, tubular, scarlet flowers.

LAWSONIA.

HENNA, CAMPTURE.

L. alba—Henna—*Mehndee.*—A large shrub, sometimes growing to seven or eight feet high, with small neat foliage, much resembling that of a Myrtle ; bears at the beginning and end of the cold seasons numerous large compact panicles of small greenish-white flowers which scent the garden with a delightful fragrance. A plant of considerable notoriety for the red dye which the leaves afford to the women of the East for staining their finger-and toe-nails. Propagated easily from seed or cuttings.

LAFOENSIA.

L. Vandelliana.—A small tree with foliage of a very neat and ornamental character ; leaves oval, smooth, rigid, and shining, two and-a-half inches long ; rather showy when in December it produces its abundance of large Lagerstroemia-like golden-yellow blossoms with numerous long stamens projecting from them.

LAGERSTROEMIA.

L. indica—An erect-growing shrub three or four feet high, with smooth oval leaves, two-thirds of an inch long ; bears in the

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rains, in unbounded profusion, large panicles of rather small, fringe-petalled rose-coloured flowers. There is a variety likewise with the flower pure white, and one with them of a lilac colour. The three varieties grown together in a group, when in full blossom, form a most lovely ornament to the garden. In the cold season it is entirely leafless, when it should be well pruned in ; easily propagated either from seed or cuttings.

L. elegans.—A large, strong-growing shrub with large handsome leaves and flowers, about ten times as large as those of the preceding ; a magnificent object when in full flower, with its great compact panicles of light-purple blossom, showing finely against its dark rich foliage.

L. Flos-Reginae.—A large tree of the Ghaut forests. Sometimes called the "Pride of India," on account of its gorgeous blossom. The latter breaks forth in May or June, along with the young leaves, and is truly a splendid sight. The panicles, which are mostly terminal, are two feet in length ; while the individual flower is not less than four inches in diameter, and mauve-purple in colour. When in blossom this tree can be seen a long way off. Major Drury says of it :—"This is, without exception, when in blossom, one of the most showy trees of the Indian forests. It is now commonly cultivated in gardens on the Western Coast, where the moist damp climate is most suitable for its growth and the full development of the rich rose-coloured blossoms. In forests near the banks of rivers it grows to an enormous size, some having purple flowers, and forming a most beautiful and striking appearance." Propagated from seed sown in February.

MELASTOMACEÆ.

CENTRADENIA.

A pretty genus of Mexican or Central American evergreen plants, with ovate-lanceolate ribbed leaves. Cultivated in the conservatory both for the beauty of their foliage and flowers. The two varieties mostly seen in cultivation are *C. grandiflora* with large rose-coloured flowers and *C. rosea* with smaller flowers of the same colour. Both are propagated by cuttings under a hand-glass.

C. floribunda.—A small herbaceous pot-plant, native of Mexico, with dark-red stems, and narrow lanceolate leaves, from an inch to an inch and-a-half long ; bears from February to March a profusion of small rose-coloured flowers, at which time it is a tolerably pretty object, resembling one of the annuals in bloom. Cuttings strike easily.

BERTOLONIA.

A Brazilian genus of dwarf sprawling pot-plants with heart-shaped, ciliated leaves having raised ribs. The cultivated species

B. Marchandi, with its variety *B. M. superba,* have beautiful velvety leaves and are very ornamental when grown in the grass conservatory, in a light rich sandy soil. Propagated by cuttings in sand, under a hand-glass during the rains. A hot-house plant on the hills.

CYANOPHYLLUM.

A very handsome genus of tropical American plants with large noble-looking leaves from one to two feet long. A rather light vegetable soil with free drainage suits them best. They grow well in the gross conservatory. Propagated by cuttings in fine sand under a hand-glass, during the rains; also by division of side-shoots when re-potting in February and March. The species in cultivation are :—

C. Assamicum.—Native of Assam, with ribbed leaves of a dark-green on the upper surface and reddish underneath.

C. Bowmanni.—Somewhat different from the last in having handsomer leaves of larger size.

C. Magnificum.—This is one of the handsome foliage plants in cultivation, with leaves of one to two feet in length, and nine to ten inches wide, tapering to a point. The upper surface of a beautiful velvet green, the raised ribs being white, while the underside of a fine reddish purple. Grows to a height of four to five feet.

C. spectandum.—Differing very little from *Bowmanni.*

On the hills it would be necessary to treat these plants as stove exotics. Flowers are of no merit.

ARTHROSTEMMA.

A. lineatum.—A pot-plant, native of Peru, with elliptical rough leaves, one to two inches long : in my opinion of no great merit though considered choice by some; bears in the cold season, rather profusely, largish heads of dingy-white flowers of moderate size. Propagated by removal of suckers.

PLEROMA.

Syn. LASIANDRA.

P. trinervia.—A choice and delicate pot-plant, of woody habit, but of small growth; very ornamental if only for its rich green peculiar foliage; bears during the hot months handsome pale-purple flowers of moderate size. Propagated by cuttings under glass in the rains.

P. macranthum.—A shrub with large mauve, purple flowers, said to grow well at Coonoor and Ootacamund. Not found on the plains.

MELASTOMA.

M. malabathricum—Indian Rhododendron.—A shrub, similar in character to the last, but of larger habit, and loose mode of growth; a rather delicate plant, requires to be grown in a pot; bears in the cold season large mauve-purple flowers; produces seed abundantly from which it can be raised easily. This is a splendid bush on the Western Ghauts.

M. sanguineum.—Bears in the cold weather purplish-blue flowers in all other respects very similar to the preceding; occasionally yields seed, from which young plants may be raised.

OSBEEKIA.

A genus containing many handsome plants with the peculiar characteristic three-ribbed leaves of the *Melastoma* and *Plemora* and producing beautiful flowers very similar to theirs; many species are natives of our Indian hills, but none, according to Firminger, able to endure the climate of the plains.

MEDINILLA.

M. vagans.—A small pot-shrub, very handsome from its dark rich glossy leaves; bears small crimson flowers, very numerous, and somewhat like those of an *Ardisia*, seemingly not opening well. A rare plant. Propagated by cuttings.

SONERILA.

S. margaritacea—A lovely small pot-plant, with oval-pointed polished dark-green leaves, marked with rows of pearl-like spots, and with deep-red stems; bears numerous small pretty three-petalled pink flowers, with showy yellow anthers. Native of the hills of India, and has been exhibited at the Calcutta shows, but is a very rare plant. Several other species are met with in Assam. Propagated by cuttings.

MEMECYLON.

M. tinctorium.—A large woody shrub or small tree, native of the jungles of India: a very beautiful ornament to the garden for its cheerful glossy foliage as well as for its flowers; blossoms in March with very small fragrant lilac flowers; leaving to the stems in compact little bunches, and covering them in boundless profusion. Propagated by layers and by seed. Syn. *M. edule* (Ironwood).

M. capitellatum.—Differs from the preceding only in that its leaves are smaller, and that it is somewhat later in its period of blossoming. *M. Hengeanum* is commonly found in the south.

MYRTACEÆ.

MELALEUCA.

M. cajeputi.—Cajeput Oil-tree.—A moderate-sized tree with pleasing, dark, evergreen, Willow-like foliage, forming an agreeable contrast with the ashy-grey colour of its withered-looking bark. In much esteem among the natives, who make use of the large flakes of inner bark, which are easily torn off, for inscribing their sacred writings upon. Bears small whitish flowers of no interest. Produces seed abundantly, which when sown by hand is rarely found to germinate, though numerous plants spring up self-sown around where the tree stands.

EUCALYPTUS.

The Eucalyptus are natives of Australasia but have proved themselves excellent growers in any country with suitable climate. They have, for example, been grown successfully in the West Highlands of Scotland as well as in India. Many are trees of enormous height. Some are said to make malarial regions less so, but this is probably as much due to the drainage they effect as to any subtle influence they may have. *Eucalyptus globulus* is the blue gum tree and the best producer of Eucalyptus oil. It grows well in the temperate climate of the Nilgherries *E. paniculata* and *E. rostrata* have grown well in Poona with a 27-inch rainfall and a range of temperature from (normally) about 40°F. to 110°F. in the year. These two species also succeed well at intermediate elevations in the south and so do *E. citriodora* and *E. marginata*. *E. ficifolius* with its profusion of crimson flowers is a very ornamental plant. The trees look best in clumps. Seedlings are easily raised by the usual methods.

NAPOLEONA.

N. imperialis.—A shrub of handsome growth and Camellia-like appearance ; native of Sierra Leone ; fine, handsome plants, were in the Calcutta Botanical Gardens, in the open ground, as well as in Mr. Grote's garden at Alipore, where they bore in March and April close upon the stems, and all but hidden by the leaves, they are not very showy flowers, which are of an apricot-orange colour, and somewhat like those of a Passion-flower. It is easily multiplied by cuttings in the rains.

GUSTAVIA.

A remarkable genus of tropical American trees and shrubs, of which one or two species are found in Botanical Gardens in this country.

G. insignis.—A shrub of three to four feet. Leaves dark green. sessile obovate, shining. Flower nearly half a foot in diameter, creamy white or slightly tinted with rose : filaments rose and anthers orange-coloured. Cultivated in the conservatory or under the shade of trees. This is a rare plant, requiring heat,

BARRINGTONIA.

B. speciosa.—An evergreen tree, notable for its large handsome character of foliage ; bears great heads of blossom, with large flowers made up of a numerous assemblage of long, deep, rose-coloured filaments, which have been likened to a painter's brush. Native of the Straits, Ceylon, and rarely S. India. An inhabitant of the tropicals. Its fruits are distributed by water seashore. Seldom found in cultivation. Propagated from seeds and cuttings, the latter with leaves attached.

B. racemosa.—A stout timber tree of similar character to the preceding. Major Drury remarks : "When in flower it has a most beautiful appearance from its long pendulous recemes of rose-coloured flowers ; commonly to be met with along the banks of the back-waters in Travancore." Propagated by seed and cuttings.

TRISTANIA.

T. conferta.—A graceful evergreen tree found in public gardens in the cooler parts of India. Introduced from East Australia, *T. neriifolia,* from the same place, is also a nice tree. Both are suitable for clumps and avenues. Raised from seed.

CAREYA.

C. arborea.—A handsome evergreen tree of the south. Effective when in flower and fruit, the latter like an overgrown Apple. Raised from seed.

COUROUPITA.

C. guianensis—The Cannon-ball Tree.—Introduced from tropical America and only found in Botanical Gardens. The large curiously-formed flowers are borne in clusters on the upper trunk and main limbs of the tree, and present a pleasing combination of rosy-purple, white, and yellow colours. The monadelphous stamens are formed into a one-sided band which, rising from the base of the ovary recurves over, so that the anthers are pressed down on the pistil. The latter, however, may or may not be covered at the time by a lateral petal. There are also some abortive stamens at the base of the band. Thrives well at Pondicherry on the east coast of the Madras Presidency and in Ceylon.

CALLISTEMON.

A genus of small trees, of which Don writes: "All are worthy of cultivation from the neatness of their foliage and beauty of their blossoms, especially those with splendid flowers of crimson and scarlet".

C. linearis—Australian Bottle-brush.—A small tree of Willow-like foliage, remarkably beautiful in April, when in blossom with its numerous Bottle-brush-like tufts of brilliant crimson flowers.

C. salignus.—An extremely hansome and graceful tree-shrub of Willow-like foliage, the leaves emitting, when bruised, a Myrtle-like odour. Very pretty when in blossom in April and May, with its numerous small white flowers.

MYRTUS.

M. communis—Common Myrtle—*Bilâtee Mehndee*.—This old familiar and most agreeable shrub thrives well in all parts of India, but better in the north-west, according to Firminger, than in Bengal. In either locality it attains to a very great size. It bears its pretty small white flowers, succeeded by its blue-black berries, in the cold season. Propagated by layers.

M. tomentosa.—A handsome shrub, native of the Nilgherries, bearing a profusion of pink blossoms, somewhat resembling those of the Peach. Mentioned in Dr. Voigt's catalogue.

EUGENIA.

E. caryophyllata—The Clove —*Long*.—Native of the Moluccas, where it grows to a rather large tree. Don says: "It is difficult to transplant. Seeds are usually sown where trees are intended to remain; for, if the roots are once injured, it is seldom they recover." Dr. Voigt states that "in Bengal it can scarcely be kept alive throughout the year." The plant grows in Malaya on porous, well-drained soil. The "Cloves" are the unexpanded flower buds.

E. Jambos—The Rose-apple Tree—Found, apparently acclimatised, in Bengal and Assam. It is useful on account of its showy foliage and flowers. The fruit has a delicate flavour and can be used for jelly making. The plant is worthy of a place in any sub-tropical garden.

E. Jambolana—The Jambul Tree.—A common evergreen tree. It forms the greater part of the forest vegetation of Mahableshwar, and from its flowers the wild bees get the peculiarly flavoured Mahableshwar honey. The fruit is a purple fruit with a stone in it, about the size of a small Plum. It makes excellent tarts and puddings. Easily propagated by seed. Superior kinds should be grafted.

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E. malaccensis.—In all respects a very ornamental tree, with large, handsome, laurel-formed, dark, glossy leaves, which relieve superbly the fine bunches of flowers with their numerous long crimson filaments ; very striking also when covered with its beautiful fruits. Propagated by seed.

COMBRETACEÆ.

PIOVREA.

P. coccinea.—Synonym *Combretum coccineum.*—A large climbing shrub with very slender stem ; requires the support of a trellis ; almost constantly in blossom with a profusion of small bright crimson flowers, borne in large compact brush-like bunches, beautifully relieved against the bright, cheerful, glossy green of the foliage. One of the handsomest and most prized ornaments of our Indian gardens. Propagated by layers, which usually take a long time before rooting. Mr. Mackintosh says that it should be grafted on *Combretum pinceanum* or some other free-growing species.

P. Roxburghii.—A powerful rambling shrub, overgrowing a great extent of space ; bears in January brush-like trusses of dingy-white flowers of no attractiveness.

P. grandiflora.—Bears flowers very similar to the first named, only much larger.

COMBRETUM.

Several species of this genus of noble scandent shrub are now found commonly enough in the gardens about Calcutta. They are apt to become rampant, and are benefited by being well cut in when the time of flowering is over, and bloom the better for it afterwards. They are propagated by layers, which are sometimes slow in rooting. Cuttings here do not succeed, and some difficulty in striking them appears to be met with in England likewise, for a writer in the "Gardener's Chronicle" observes : "This arises from not selecting fit pieces for cuttings, for short-jointed firm bits of young wood, treated in the ordinary manner, root freely. These are easily obtained from which plants may be readily raised but these will take four or five years at least before coming into bloom.

Mr. Mackintosh says :—"As soon as the young wood has ripened, and the leaves begin to fall, the lateral shoots should be cut back to within one bud of the base, and if the spurs thus formed along the main stem become too crowded, they should be thinned out to a foot apart. By this means *C. grandiflorum* has been made to bloom, which is one of the shyest flowers of the genus." *

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* "Book of the Garden," Vol. p. 717.

C. comosum.—A large climbing shrub, admirably adapted for covering an arbour or archway; forms a delightful ornament during the cold season, when it is a perfect mass of bloom with countless large compact, brush-like clusters of bright-crimson flowers.

C. rotundifolium.—A large rambling shrub; bears dull white flowers; not at all interesting.

C. gradiflorum.—A rambling shrub, of very powerful habit; requires a vast deal of room, and a very robust support to grow upon; bears in November, in great profusion, tusses of fine deep-crimson flowers.

C. macrophyllum.—In every respect a truly noble plant: nothing can surpass it in magnificance and beauty when in full bloom in February and March; the very large, laurel-shaped, wavy, blackish-green leaves of themselves render the plant very handsome and desirable. It has the advantage also of being less rampant in growth than other species; flowers borne in moderate-sized brush-like bunches of the most vivid deep-carmine, admirably relieved by the dense, dark, grand foliage.

C. pinceanum.—A shrub of considerable size, described by Sir J. Paxton as bearing "panicles of flowers a foot and-a-half long, of a red or purplish-red colour." With this description the plants so named in the Calcutta Botanical Gardens do not altogether correspond, as the flowers they produce are of a light vermilion or cinnabar colour. Blossoms in February, when almost leafless, becoming then an entire mass of bloom with its large compact sprays of numberless trusses of flowers.

C. densiflorum.—A noble scandent shrub, with large handsome leaves; bears fine trusses of beautiful crimson blossoms in the cold season.

C. Wightianum, C. chinese, C. acuminatum.—These last three are large rambling shrubs, bearing whitish flowers, not sufficiently ornamental to entitle them to a place in the garden.

QUISQUALIS.

RANGOON CREEPER.

Q. indica.—An extensively-growing scandent shrub, requires a strong trellis (better a tree) for its support; bears during the hot weather, rainy season, and the fact all the year round, in constant succession, profuse clusters of middling-sized flowers, at first white, but changing on the following day to a rich blood or scarlet colour. This mixture of red and white gives the plant a unique and charming appearance while in flower. In rich soil the growth is very rampant and unmanageable; the plant should be closely cut back during the dry season. Easily raised from layers and cuttings.

CSL

TERMINALIA.

This splendid genus of useful and ornamental trees affords several species in garden cultivation. *T. Calappa*, the so-called Almond tree, or Badam, is perhaps the most popular in compounds where, during the cold season, the matured leaves assume the beautiful autumnal tints seen in deciduous trees at home. The form of the tree also, with its widespreading branches disposed in distinct tiers, renders it a popular object. It is not, of course, the true Almond tree.

HALORAGEÆ.

MYRIOPHYLLUM.

M. intermedium.—An aquatic herb found in still waters throughout India.

DROSERACEÆ.

A family of herbs represented in India by only two genera.

DROSERA.

INDIAN SUNDEW.

D. Burmanni—A small reddish, star-like herb with glandular hairs; found in the most beds of deep nullahs, or where water may be oozing out of the ground. Abundant in South India. An interesting little plant, being a fly-catcher. Flower rose-coloured, in small spikes or racemes.

DRASSULACEÆ.

CRASSULA.

C. nitida and *C. miniata.*—Small herbaceous pot plants of a succulent nature, very showy and beautiful when in flower, with their trusses of crimson blossom, much like that of a Phlox, Firminger brought down plants from Ootacamund, where they thrive well, but found them unable to exist in the climate of the plains, as is indeed the case with the majority of plants of this description, natives of the Cape. They do well on the hills. The only Indian one is *C. indica*, with rose-coloured flowers.

KOLANCHOE.

A genus of erect-growing succulent herbs. Useful for rockwork where the different species attain a height of one to four feet.

Leaves green or fleshy-orange, mostly very irregular in size and form

CSL

The India species are *K. glandulosa*, *K. spathulata*, *K. floribunda*, *K. grandiflora*, *K. brasiliensis*, and *K. laciniata*. But there are several varieties, among which one called *K. virens* keeps in bloom for a month, and has pretty orange-coloured flowers.

K. heterophylla.—An herbaceous plant with thick succulent leaves, weedy-looking, and hardly suited for the garden, though somewhat cheerful when in blossom in February with its bright yellow Oxalis-like flowers.

COTYLEDON.

NAVELWORT.

A large genus of succulent herbs and shrubs, mostly introduced from the Cape of Good Hope. The species mostly found in Indian gardens are *C. agavoides*, *clavifolia*, *Cooperi*, *gibbiflora*, *Peacockii*, *glauca*, and *secunda*. The two latter are Mexican, rosette-like succulents better known under the old generic name of Echeveria. The House Leek, C. *Sempervivum*, may be found up north, also at Ootacamund.

BRYOPHYLLUM.

B. calycinum.—An herbaceous plant, in some places found growing common by the wayside and in light jungle ; well known for the curious property its think scolloped succulent leaves have of throwing out roots and soon becoming plants by merely lying upon the surface of the damp ground ; very ornamental when in blossom in February, with its numerous large globular-formed flowers of pale-green tinged with red, drooping prettily like little bells from their erect flower-stem.

SEDUM.

STONECROP.

These pretty succulents are only adapted to the colder parts of the country. A prostrate species used for carpet-beeding at Bangalore, throws up in cymose masses, during the cold season a fine display of pretty orange flowers. Several species do well at Coonoor and Ootacamund.

TURNERACEÆ.

TURNERA.

T. trioniflora.— A small herbaceous shrub, native of Brazil, with oval dull-green leaves two inches long ; bears mostly in the

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cold season large, cistus-like, sparkling, cream-white flowers, with dark purple-eye. Propagated by division. Difficult to transplant.

T. ulmifolia.—Of the same size as the last; bears its lanceolate shining leaves crowded on the summit of the stems, above which are borne at all seasons its large dull-yellow flowers; met with growing out of old walls about Calcutta.

SAXIFRAGACEÆ.

SAXIFRAGA.

S. sarmentosa.—A pretty herbaceous plant, with small round leaves, variegated above, and of a dark-red colour on their undersurface; usually grown in England in pots suspended from the window-frame, whence it lets drop its delicate, thread-like, red runners in such profusion as almost to give the appearance of matted hair. Plants were introduced into this country from China by Mr. Fortune, but they do not seem to thrive here, nor manifest any tendency to send out the runners, which constitute the principal feature of their beauty.

HYDRANGEA.

H. mutabilis.—This plant, which in the Channel islands becomes a large, noble, bushy shrub, six or eight feet in height, is not uncommon in Calcutta, but is grown in a pot, and never attains to more than a foot and-a-half high, nor bears those magnificent trusses of bloom which render it so conspicuous an object of beauty in Europe.

On the hills this plant thrives to great perfection, and blooms in profusion. It is at its best during the rainy season, when it attains its greatest size. Needs very little care or attention. It is by nature a marsh plant, and requires abundance of water, particularly at the period of its most vigorous growth in March and April and is best placed in a pan of water. It requires a light soil, and to be kept in the shade. Sir J. Paxton says that "much of the success in the culture of the plants depends upon their being placed in a southern aspect before flowering to ripen their wood and buds." The great difficulty, however, here is to induce them to make wood. Flowers in April and May. Propagated easily by division.

H. Japonica.—This plant differs from the last in the leaves, being of a longer, more pointed form, and of a more verdant fresher green. The central flowers also of each truss of blossom are fertile while those of the last are all barren. The habit of the two species is precisely the same, as well as the mode of cultivation. Attains a fine size and blooms freely on the hills.

H. Japonica, variegata.—An exceedingly beautiful plant, with large cream-coloured leaves blotched with green. Firminger brought down plants of this from Ootacamund for the Calcutta Botanical

Gardens, as well as for his own, but they all perished in the hot season, seemingly incapable of surviving the heat of the plains.

BREXIA.

B. chrysophylla.—A small tree introduced from Madagascar. Cultivated in the conservatory, where its large leaves of a beautiful golden tint are attractive. A light sandy soil, with a few bits of old mortar, suits it best. Propagated by cuttings under a hand-glass during the rainy season. Requires protection and heat on the hills. Other species are *B. madagascariensis* and *B. spinosa.* All will succeed in tropical India.

DEUTZIA.

D. corymbosa and *crenata* with varieties should succeed well at such places as Simla, Darjeeling and Ootacamund. They are hardy, deciduous shrubs with pretty white or pink flowers.

ASTILBE.

A. Japonica.—Japanese Spiraea.—This tall herb, with its fine terminal spikes of pure white flowers, is highly decorative, whether on the lawn or in a shrubbery. *A. J. variegata* is an improved variety of the type species. These should do at hill stations

PHILADELPHUS.

P. coronarius—Mook Orange or Syringa.—This hardy ornamental shrub will only succeed in the far north and at high altitudes in the south. "Grows luxuriantly at Ooty (Ootacamund). should be pruned to induce flowering."—R. T. B. "For propagating take root growths. Does better in Ooty than Coonoor."—*C. G.* The double flowering varieties, *P. C. primulaefloras* and *P. C. nanus*, should be introduced.

ESCALLONIA.

A genus of ornamental evergreen shrubs from South America. One species (name unknown) is reported to be doing well at Coonoor and Ootacamund. *E. floribunda*, *E. macrantha,* and *E. organensis* are the best species to introduce at hill stations. They are propagated by layers and cuttings.

ROSACEÆ.

RIBES.

CURRANT

R. sanguineum and other species of the "Flowering Currant." are said to thrive well at Ootacamund, and to bloom all the year round. They are, of course, useless for the plains.

ROSA.

THE ROSE.

Goolab.

It is absolutely impossible to deal with Rose culture satisfactorily in the small space which can be allotted to it in a work on general horticulture. There exists a formidable literature dealing with the cultivation of this beautiful plant in Europe and America, but little of value has been published on Rose culture in this country. The following original remarks of Firminger are therefore reprinted, as they are records of actual experience and are therefore of permanent value.

Firminger writes, in the third edition, as follows:—

"It must be within the memory of those now living that the gardens of Bengal at least, if not of all India, hardly possessed a Rose that was worthy of the name. It is over fifty years ago that the Rose Edouard was introduced. Previous to that there was nothing better to represent this lovely race than the common China, the Musk, and the Bussora, putting forth a show of blossom for one short season, and shabby and disagreeable all the rest of the year. The old beautiful so-called Summer Roses of Europe, if introduced, were found unable to exist here. But a great change has taken place within a very recent period. Races of Roses entirely new, the Teas, the Noisettes, the Bourbons, have come into existence, and happily found in India a home thoroughly congenial to them.

But the same uniform success has not attended the introduction of the Hybrid Perpetuals, at any rate in Bengal. Some have proved charming acquisitions, but a large number, it has been found, are not deserving a place in our gardens at all; some being unable even to exist here for any length of time, and others, though thriving vigorously, seldom or never yielding flowers. Several, moreover, that do blossom, though deservedly of high reputation in Europe, produce in this country small and not very double flowers, frequently only semi-double, very deficient in depth of colour, and greatly wanting in due richness of perfume.

But this is not all. Many of these Roses also, extolled in the catalogues of English dealers, are in truth unworthy of notice; while many, again, are so similar to others of a different name that professional Rose-growers themselves can hardly distinguish them. In India, too, this similarity, it seems to me, has a tendency to become even more positive, peculiarities that might perhaps be recognized in a European climate often becoming here entirely lost. This is, however, not the case on the hills.

Considering the large number of Roses now existing in India, and the ease with which they may be multiplied, few perhaps would care to procure them from Europe. I would only here observe that Roses, to bear being sent from England in the rude way in which they

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are usually conveyed, should be stout plants two or three years old, upon their own roots, if such are to be had. Nurserymen, however, seldom keep such plants, or cultivate any budded Roses. But Dwarfs budded on the Manetti stock, for purposes of conveyance, are perhaps all but as good as those on their own roots. These are always to be had, and are best to be ordered. Standards of Half-Standards, that is Roses budded upon the Briar, from two to four feet high, should never be sent for, as the length of the stems not only adds to the trouble and expense of sending, but is rather unfavourable than otherwise towards the budded part retaining its vitality. Plants budded on the Manetti stock have the bud inserted low down near the root of the stock, and should be always planted with the budded part an inch below the ground. In that case in course of time the Rose forms roots of its own ; and the stock of the Manetti, on which it has been budded, ultimately dies.

Some of the plants sent out on their own roots may appear to have perished, and to be quite dead. Never take it for granted that such is the case ; plant them ; notwithstanding, and take all possible care of them ; they often recover themselves and push forth again when least expected.

The propagation of plants generally by layers and cuttings has been treated of elsewhere, but a few remarks may here be made especially applicable to the Rose. *

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* Grafting and budding should be done not only when the sap is rising but also when there is moisture in the air without wind. For subtropical India, where the rainfall ranges from 25 to 50 inches per annum, the Rose Edouard is considered the best stock. But at cool stations like Ootacamund, where the rainfall is heavy, the Rosa multiflora is preferred as a stock, while many varieties of Roses succeed best upon their own roots. At hill stations, most varieties do well planted in the ground; but such is not the case at lower elevations where rainfall is comparatively light and where the dry season usually extends to nearly five months. At Bangalore, where the rainfall is 35 inches, followed by a long dry season, only a few of the hardiest climbers, such as Marechal Niel and Cloth of Gold, are planted in the ground, except for purposes of propagation, all others being cultivated in pots. Under the latter treatment, full grown plants are pruned and reported twice a year, e.g., in May—June and November—December. But this can only be done with strong plants and may very easily be overdone, much to the detriment of the plant. The following directions for planting Roses in the open are given by Mr. R. L. Proudlock, at one time Curator of the Botanical Gardens at Ootacamund. "Dig pits 2′×2′×1′6″ in depth, fill in with good strong rich loam, or the strongest loam you can find, mix one basketful of cowdung, well rotted, with the top half of the soil in each pit ; the same quantity of rich leaf mould may be added. Fill in the pits half full with soil, the top half to be filled in with the compost of soil, manure, and leaf mould. When filled in, the soil may be pressed down sufficiently to prevent sinking later on. Then plant the Rose in the top centre of the pit, taking care not to plant it deeper than is absolutely necessary. To grow Roses we avoid deep planting, for the nearer the surface you can keep their roots feeding, the better will they flower. The reason for manuring only the top

Layering.—The layering of many Roses may be performed at all seasons of the year, but with some few of the choicer kinds it will prove most successful in either October or February.

Mr. Errington very kindly communicated to me the following happy method he adopted for layering Roses. He plunges a pot filled with soil in the ground, at the place where the layer is to be made, and layers the Rose in the usual way. This is done in February, shortly before the hot season. He then places another pot upon the soil of the pot in which the layer has been made, half fills this upper pot with earth, and keeps the remaining half always filled with water. The water slowly trickles down to the layer below, and keeps it constantly moist. The layer is ready to be cut by the beginning of the rains.

Cuttings.—The best season for laying down cuttings of Roses is undoubtedly in November, about the time that the annual pruning is done. By March they become nice little rooted plants, and may then be taken up and potted off. Cuttings of vigorous and healthy growth from the Tea-rose, Devoniensis and Elise Sauvage will. I have found, strike readily if put down in July during the rains.

I am indebted likewise to Mr. Errington, some time head-gardener of the Agri-Horticultural Society, for the following particulars respecting his mode of raising Roses from cuttings. To strike them in he uses a mixture of one part of fine charcoal to three of sand. One advantage of this mixture, he says, is that the cuttings, when struck, will continue growing and thriving; but that, when struck in sand alone, they must be removed and potted in soil, or they soon die. He always uses slips with heels of the old wood. He takes care to lay the heel of the slip against the side of the pot, but not the whole length of the slip. He says the mixture cannot be pressed too closely round the slips. He covers them with a bell-glass.

Cuttings in water.—During one cold season I made experiments on striking cuttings of Roses in bottles of water. The ones I attempted were the delicate Tea-roses Devoniensis, Elise Sauvage and Peel's Rose, and with each I met with complete success. The following I found the points essential to be attended to:—

The water must be perfectly clean and pure, and changed frequently to keep it so. Not more than one or two slips must be

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half of the pit is on the score of economy; supposing you were to manure the whole, the nutriment contained in the upper half is gradually but certainly carried to the lower level by the agency of water." For pot culture, at Bangalore, especially when forcing for exhibition growth, a compost consisting of the following ingredients is preferred—2 parts red loam, ½ part sand, 5 parts half-rotted horse dung and a good sprinkling of fine bone meal. Good drainage is a *sine qua non;* and with the crocks, the best growers, add a few biggish lumps of charcoal. By sweetening the soil, the latter does a lot of good. As growth progresses some useful stimulant, such as liquid manure, nitrate of soda, or a solution of dried blood may be applied if necessary. But this is also easily overdone, and different fertilisers should not be applied together.

put in the same bottle, or the water will become corrupt and the slips rot.

The slips must be of the youngest growth, the foot stems of a flower that has just blossomed and fallen off.

The bottles should be placed on the north side of the house or behind some screen where they may have plenty of light without sunshine, and be sheltered from wind. An old box, without the lid, laid upon its side, with the outer surface of the bottom facing the sun, serves admirably for putting the bottles in.

Small vials do not contain water enough ; ten-ounce confectionery bottles should be used ; tumblers will do, but are rather inconvenient.

It is exceedingly interesting to watch the cuttings gradually form their callus, as they will completely do in about three weeks, and then some time after emit one or two white silvery fibrous roots. As soon as they do this, they should be potted off at once.

Budding.—The budding of Roses is performed with the greatest facility and success in the Upper Provinces, and by this method choice Roses may soon be multiplied there to any extent. The kind employed for a stock is the Rose Edouard and the Grant Rose, which grow there with great vigour, the bark yielding most freely to receive the bud. The operation may be performed in February.

In Bengal from the difficulty of finding a stock, the bark of which will separate freely from the wood, budding is seldom or never attempted. Buds of any valuable Rose, however, one chances to obtain may be turned to account, sacrificing some common young Rose-plant by cutting it completely down, removing the soil, and inserting the buds upon the stump or upon the root, the bark of which will always yield readily.

But there is one mode of proceeding by which, if adopted, budding would succeed probably as well in Bengal as elsewhere. And this is a matter of some importance, as when Roses have become multiplied in this way, it may possibly be discovered that there are those which in India, as in England, succeed well when budded on another stock, but indifferently grown on their own roots.

The plan would be very similar to that given by Mr. Rivers. Lay down in an open piece of ground in the rains a good supply of cuttings of Roses Edouard, about a foot long, having first removed all buds but the lowermost one at the base of the cutting and the two uppermost. Lay the cuttings as slopingwise as possible, burying as much as two-thirds of them, so as to leave only the topmost bud exposed, and press the earth firmly down upon them. When they have struck and become thoroughly established, they will be ready for budding upon ; but they must be left just as they are till required for that purpose. At that time the earth must be removed, the upper part of the cutting laid bare, and the bud inserted in the usual way as low down on the stock as can conveniently be got at. The bark of the stock, it will be found, will always part readily, so long as kept moist by being let to remain beneath the soil.

Grafting—Grafting, or more properly inarching, is the practice that is uniformly adopted in Bengal for the propagation of the choicer kinds of Roses—in my opinion a very inferior mode of proceeding. The stock employed for this purpose is of the Rosa gigantea and the China Rose (Duc de Berri). The best time to perform the operation is November, or as soon after as the plants have made new growth after the annual pruning.

Standards.—Standard Roses are rarely seen on the plains of India. These, when in full blossom, present a very handsome appearance. On the hills it is different, as it is possible to make very fine standards there. Of course in this country, where high winds prevail, they require stout stakes or iron rods for their support, even more than they do in Europe. The stocks employed are of the Rosa gigantea or multiflora.

Pillar Roses.—Roses when trained in this way (and it is only such as make long and vigorous shoots that can be so) have a very beautiful appearance. Proceed thus :—Cut away clean from the ground all but three stems, and train these to a stout stake or bamboo, six feet or more high. To induce these stems to produce flowering shoots along their whole length, in October shorten their tops, unfasten them from their stake, and lay them at full length upon the ground. Left thus in a horizontal position, the buds upon them will break into shoots, which otherwise they should not have done. When they have done so, carefully raise the stems and bind them to their stake again. These sidelong shoots, pruned back after flowering, will form the blossoming spurs in after years. The main stems, however, are said soon to wear out, when they require to be cut completely down and replaced by fresh ones.

Situation and soil.—Roses, raised either from cuttings or layers, will come into full perfection of bearing by the second season after they have been planted out, particularly if they have received liberal treatment. They do not like a wet undrained soil, and as little do they like a dry and arid one. It is therefore best to plant them in a gentle raised bed, from which the superabundance of wet during the rains may pass off; but as a situation of this kind subjects them to a greater degree of drought during the hot months, they must at that season be from time to time, liberally supplied with water. Generally speaking, they suffer during March more than at any other period of the year. In that month it not unfrequently happens that the leaves are entirely devoured by some insect that seems to prey upon them during the night.

A writer in the *Gardeners' Chronicle* states that "charred garden refuse is used largely by Messrs. Wood in the cultivation of Roses ;" * and Mr. Rivers recommends turves pared thinly and baked in an oven or roasted upon an iron plate, as an excellent ingredient to mix in the soil for Roses.** Acting upon this I have made parings of Doob-grass, laid them several days to dry in the sun, pulled them to bits, and roasted them in an earthen vessel on a *chulah*. Using this abundantly with common earth and old cow-manure, I have found not only Roses, but other potted shrubs thrive in it most vigorously.

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* No for July 30th, 1859.

Roses love now and then an entirely new soil, and transplantation every year or two is the very best thing that can be done for them. When not transplanted, they should in October, after the rains are over, have their roots laid bare by the removal of the earth for two or three weeks, and then covered in with new soil, well enriched with old cow-manure or, better still, well rotted night-soil.

Surface dressing during the months of December and January I have found of prodigious benefit, making the plants break forth with wonderful vigour. Drawing the earth away from the stem, so as to form a circular ridge at a foot's distance around it, I throw into the shallow basin thus formed a basket of fresh cow-dung, and from a considerable height pour water upon it. The water thus passes into the soil as a thick liquid manure. A fresh quantity of cow-dung is applied at the interval of about a month.

Pots and ring-pots.—When well cultivated, Roses appear to me to thrive and blossom far more satisfactorily in the open ground than they do in pots. A common mode of cultivating Roses, and one of which the natives are very fond, is to grow them in ring-pots. These are earthern cylinders, sixteen inches in diameter and two feet long, let into the earth endwise about a foot deep, and filled with soil to within three inches of the rim. The method of the natives is to cut the Roses planted in these completely down to within two or three inches of the roots in October ; a week or two later to remove the soil from the roots, and, having left them exposed a few days, to fill in with a solution of oil cake of the consistency of thick mud, very offensive to the nose at the time. The plants under this treatment, it is true, blossom very beautifully a month or so afterwards, but it is a mode of cultivation that possibly would not suit every one's taste." So far Firminger, the following remarks are by a later hand.

Rose culture on the hills.—The cultivation of Roses on the hills is attended with far more satisfactory results than on the plains. They come to astonishing perfection, quite unknown on the plains, even with very little care and attention. Especially is this found to be the case with Roses in pots.

Having secured a stock of plants, say in October, very little can be done beyond plunging the pots containing them into the ground with a shelter overhead of some sort to protect them from the effects

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**"Rose Amateur's Guide," p. 175, 6th ed.

of the severe winter. At this time they require very little water—only just sufficient to keep them alive.

About the middle of February, the pots should be taken up, the plants pruned in thoroughly and repotted in fresh soil and a size or so larger pots. Begin watering now a little more liberally. By the beginning of March the leaf buds will begin to swell, and by the end of the month they will have burst into leaf and formed young bunches. They should be copiously watered at this time, occasionally with liquid manure. The flower buds will begin to show themselves about the third week in April, as a rule, and from May to November they will go on blooming in great profusion, according as the class to which the plants belong. June, however, is the month when Roses are at their best on the hills.

In order to have a constant succession of flowers, the branches that have made vigorous growth, and have finished blooming, should be cut back to within six eyes, when they will push forth new growth again. It is, under any circumstances, best to cut back all branches that have done flowering, as otherwise they exhaust the plant. When this is not done, the plants assume a ragged and straggling appearance, do not bloom, and exhaust themselves very soon.

In pruning, one golden rule should always be kept in view. It is: "The more growth, the less pruning, and *vice versa.*" Plants of vigorous growth do not need severe pruning, but only require the removal of old and worn-out wood, and the current year's growth to be cut back to within six and nine eyes. Plants of feeble growth should be unsparingly pruned. Two eyes, or at the most three, should be left in the case of the current year's growth; while the old wood should be entirely removed with a clean cut of the knife.

Great discrimination is, however, required in pruning, and success can only be attained by constant practice and observation. So many different points have to be taken into consideration that no hard-and-fast rule can be laid down in this connection. As a general rule, however, it may be stated that Tea, Noisette, and China Roses scarcely need any pruning beyond the removal of the old worn-out and dead wood. All other—especially the Hybrid Perpetuals—are greatly benefited by a vigorous application of the pruning knife. But, as has been observed above, judgment and discrimination must be exercised; and it is well to weigh all essential points before commencing operations. For pruning purposes, the Secateurs, or French pruning shears now to be had of any ironmongers of Calcutta, Bombay, and Madras, will be found best, as there is less risk of disturbing the roots of the plants, which often happens when the knife is used, especially by less experienced growers.

On the hills, Roses can be propagated either by cuttings, layers or budding. All three methods are equally successful. The best time to put down cuttings is in February, after the annual pruning.

But, unlike the plains, cuttings will strike readily at any time between February and October. Layering is best done, from July to September; while for budding, May is certainly the best month.

In putting down cuttings, it will be found that if glazed frames with bottom heat are used, the percentage of successes will be very large. Nothing but pure sand, mixed with charcoal pounded fine, should be used for putting down cuttings in. It is a mistake to use any other soil, although, when pure sand is not available, common garden mould must of necessity be used.

One essential point in Rose culture on the hills is the watering. Unlike the plains, the supply is not abundant, and yet it is essential that when the plants are in vigorous growth, they should receive a plentiful supply of the precious fluid. Nevertheless, the general tendency of *over-watering* should be avoided, especially in the case of potted plants. Evaporation and absorption do not take place to the same extent as on the plains; therefore, plants in pots should not be watered more than once a day, and that in the evening. During the rainy season no artificial watering is needed; while in the winter only just sufficient should be given to keep the plants alive.

The foregoing general directions for the cultivation of the Queen of Flowers on the hills are certainly limited; but the scope of this work does not admit of greater detail. Nevertheless, they will be found sufficient for all practical purposes.

Roses for Exhibition.—Flower shows are now common in most parts of India. Roses, both in a growing state and in cut-blooms, now form a conspicuous feature of these functions, and a few directions as to the manner of getting them ready for such purposes appear to be necessary.

In the case of growing plants on the plains, a selection should be made during the rains, and they should be potted off and kept separately. Their growth should be studied and kept within bounds. They should be especially treated in the way of soil and watering, so as to produce plants healthy in appearance, with good foliage and well-developed blooms. They should not be pruned before the beginning, or even the middle of November, and the young shoots pinched back. This will induce a bushy growth, and keep back the blooms till the time of the show, which on the plains is usually held about the second week in February. The blooming should be so regulated that the flowers will not open until about a day or two before the show. A great many varieties bloom in seven weeks from date of pruning. The red flowering sorts take a few days longer than the whites. Care should be taken not to leave more than two flower-buds on each stem, all the rest being pinched off. By this procedure all the strength of the stem goes to the two remaining buds. Liquid manure should be liberally used in January and February. A few applications of a solution made of sulphate of iron (known in the bazaars under the name of *kasses)* will add to the brilliancy of the flowers. An ounce to a gallon of water is the proportion. Plants intended for exhibition purposes should be kept in a situation where the hot rays of the midday sun will not heat on the blooms, especially a week or so before the show.

In the case of cut-blooms, the plants from which they are intended to be taken are best grown in the ground. It is, however, necessary to prepare the ground with suitable soil before planting. Budded or grafted plants of the previous February should be selected, and put down about the beginning of the rains. They will have made and ripened their wood by the time the pruning season comes round. Those who possess a good selection of Roses already planted out should, of course, utilize them for cut-blooms, and should select the plants from which they intend to exhibit beforehand. These should be treated in the same way as the potted plants to secure first-class blooms.

In selecting varieties, those only should be chosen which possess good forms, such as the globular, cupped, and imbricate. Expanded flowers are not considered fit for exhibition purposes. Fragrance and "substance" are also considered important recommendations. For instance, Marechal Niel, Gloire de Dijon, La France. Captain Christi, Star of Waltham, Louis Van Houtte, Senateur Vaisse Paul Neron. The Bridge, Souvenir d'um Ami, Xavier Olibo, Bessie Brown and Alfred Colomb, are excellent types of what exhibition Roses should be. The number of varieties to select from, however, is almost unlimited, but some direction must be exercised in choosing those that are likely to bloom when they are wanted.

One of the most important considerations at floral exhibitions in England is that the plants and cut-blooms are *properly and correctly named*. A Rose without a name at an exhibition, no matter how beautiful and cultivated, loses all its value as an exhibition plant. This point is not rigidly insisted upon in this country ; but it should be, not only in the case of Roses, but of every other species of plant exhibited.

The pots or tubs in which exhibition plants are grown should be well made, uniform in size and shape, and, above all, clean.

For cut-blooms, the best thing to use is the exhibition box so common in England. The following is a description of it ;—It is made of common deal wood on the principle of the ordinary writing desk. The length varies, if required, for 24, 18, 12, or 6 Roses, as the case may be ; but the breadth and height, both at back and front, remain the same. Thus, for 24 Roses, the box should be 3 feet 9 inches long, 18 inches breadth ; height, 7 inches at back and 5 inches in front :—

	Length.	*Breadth.*	*Height.*	
For 18 Roses	2 ft. 9 in.	1 ft. 6 in.	Back 7 in.	Front 5 in.
„ 12 „	2 „ 0 „	„	„	„
„ 6 „	1 „ 3 „	„	„	„

The foregoing measurements are given by the Rev. S. Reynold Hole, and are found to be the best for all practical purposes. The two wood-cuts below are taken from his book on Roses.

Fig. 36 represents the lower portion of the box, and Fig. 37 a vertical section. The cover is six inches in depth at the back and eight inches in front being 1½ inches longer and wider than the box, and having a narrow beading within the four sides, half an inch from the bottom of the lid, which overlaps the box, leaving ample room for the blooms. The covers are secured by stout leather straps for travelling. Within the box, strong laths, ¾ × ⅞ inch, extending the length of the box, and six in number, are nailed to strong pieces of wood, one at each end, two inches below the surface. The upper and lower laths should be one-eighth of an inch within the box, and the remaining four so arranged as to leave three spaces 1¼ inch wide —three for placing the blooms in, and two for reducing weight. There will be a space of 1¼ inch between the laths and the upper edges of the box, which should be filled as follows.—Cover the laths with sheets of brown paper, too deep, and cut to fit the box, upon which place fresh moss. This, however, is not always procurable on the plains of India, and the writer has seen "Doob-grass" freshly cut (especially by lawn mower) used as a first-class substitute. Ferns and other foliage might be arranged over this to heighten the effect.

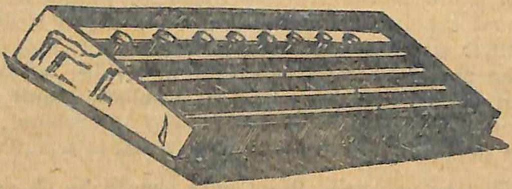

Fig. 30.

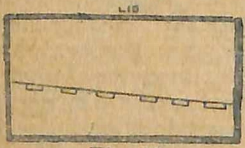

Fig. 37.

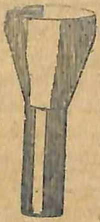

Fig. 38.

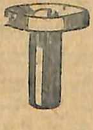

Fig. 39.

The blooms themselves are first placed in zinc or tin tubes, as illustrated in Fig. 38 and 39. These tubes are 4½ inches long, and 2 inches wide at the top, tapering to one inch at the bottom. It will

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be observed that the top (Fig. 39) is movable, so as to admit of the tube being filled with water without disturbing the bloom. Each Rose is cut with a long stem, is put into a tube filled with water and having its name legibly written on a lebel attached to a stick, which is struck into the moss or "Doob" beside the bloom.

The best time to cut blooms for exhibitions is in the early morning on the day of the show. In some cases it will be found necessary to cut them overnight, in which case they should be left out in the dew—of course, first placing them in a tube filled with water.

A great deal of the success of a collection of cut-blooms depends upon their arrangement in the box according to colour and contrast. In this, individual taste and judgment must guide the exhibitor.

Descriptive Lists.—The reviser of the fourth edition of this work did not consider it either expedient or necessary to make any change in the classification and descriptive lists of Roses given by the author, as to do so would be to alter entirely the character of the book. There are now one or two works devoted entirely to the cultivation of Roses in India, in which very full descriptive lists will be found by those desirous of growing very large collections. Moreover, the catalogues issued by English and Continental Rose growers—especially William Paul and Son, of Waltham Cross—are Rose Manuals in themselves.

It must, however, be confessed that the lists to be found in this work are very far from complete, for hundreds of very desirable and really lovely varieties have been added to our already extensive collection, for information regarding which readers are referred to the two or three works on Roses in India and to the catalogues mentioned above.

Firminger continues:

"*Groups.*—Roses now in cultivation either belong to, or derive their origin from, two well-defined groups:

(1) The Roses of Europe and Western Asia, such as the old Cabbage, French, and Damask Roses, the general character of which is that they bloom only in June and July.

(2) The Roses of the Eastern Asia, such as the China, Bengal, and Bourbon Roses, which bloom nearly throughout the whole year.

Now scarcely a Rose of the first of these groups has been found to succeed in this country; while the Roses of the second group, as far as my observation goes, bloom far more beautifully in India than in England.

But from crossing and interbreeding the Roses of the two groups, cultivators have raised of late years an immense number of hybrids,

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and for the guidance of those who wish to procure any of these hybrids from Europe, it may, I belive, be laid down as a rule that the more hybrid has of the blood (to speak familiarly) of the second group, the more likely it is to succeed in this country, and the more of the first group, the less likely. Roses, for instance, called Hybrid China and Hybrid Bourbon, producing flowers of great beauty, owe so much of their parentage to the first group that they inherit from it the property of blooming only in summer, and none of these, be it observed, have been found to answer in this country. By crossing again, however, these hybrids, so as to throw into their progeny a greater affinity to some Rose of the second group, new hybrids are produced which possess this property, *viz.*, that after blooming in June and July, form out the flowering shoots fresh, or as they are sometimes termed *Secondary,* shoots break forth, which produce flowers in the autumn. Hybrids that possess this property are what are called by the French *Hybrides Remontants* and by the English Hybrid Perpetuals. The more, then, a Rose possesses of this property, the more we may conclude that it is suited to this country.

Of climbing Roses, notice will be taken further on.

Cultivators in England arrange Roses in two great divisions according to the season in which they bloom. The Roses of the first division are called Summer Roses, from blooming only in the summer ; those of the second division Autumnal Roses, from their blooming in the autumn as well as in the summer. For convenience I adopt the same arrangement, observing that in this country the Autumnal Roses often put forth poor, small, semi-double flowers during the rains, blossom in perfection in November or December, and again, but not so finely, in Fdbruary. The Summer Roses blossom only in February or March."

DIVISION I.

ROSA CENTIFOLIA.

This group contains the several varieties of Cabbage, including Moss Roses, different sizes and shades of colour, from crimson to pure white. No Rose of this group, as far as I can ascertain, has ever been brought to establish itself and thrive in Lower Bengal, nor, as I believe, in the plains of India at all. Roxburgh in his "Flora Indica" has, it is true, specified *R. centifolia*, but it is *R. damascena* he intends, which he accounts only a veriety of *R. centifolia.*

Moss Rose, Rosa centifolia var. muscasa.—This Rose has been several times introduced but never brought to thrive, and establish itself. Even in the apparently more congenial climate of Ootacamund, I learnt that it had not been found to succeed. In the Punjab, I am told, it thrives very tolerably, and may be budded with great success, but that it is most reluctant to blossom ; but I am led to suspect it is not the true old Moss they have there, but one of the many hybrids that have been raised from it. On the hills, however, the several varieties of Moss Rose thrive and blossom freely. Examples :—Blanche Moreau, Little Gem, White Bath, Crimson Globe, Provence.

ROSA DAMASCENA.

DAMASK ROSES.

Bussora or Persian Roses.—The Bussora Rose is distinguished for the rich perfume of its flowers, is common all over India, and in some places cultivated extensively for the manufacture of *atar*. There are two varieties, the red and the white, only partially double, very fugitive, blossoming for one brief season—in March. The stems are profusely covered with small fine spines, and the plant has rather a shabby, unsightly appearance. The usual practice is to head down all the stems in November. remove the earth, so that the roots be laid bare for a week or two, and then fill in the earth again with a liberal supply of old cow-manure.

The Bussora appears to be the form of *R. damascena*, such as we might almost expect to find it in its wild, uncultivated state. In this state, seemingly, it is alone capable of existing in India. For I know of no other form of the Damask Rose that has been established in India—not one certainly of the sweet and completely double varieties that in past years were so much the ornament of English gardens, as indeed of some few they even now are. Examples:—York and Lancaster, Red Damask, La Ville de Bruxelles, Madame Stoltz, Madame Hardy.

HYBRID PROVENCE : HYBRID CHINA : HYBRID BOURBON : ROSA ALBA : ROSA GALLICA: ROSA SPINOSISSIMA.

Of these several groups, hardly a Rose will be found to which the climate of India is adapted. Of the Hybrid Provence and Hybrid China groups, plants introduced by me existed in a very unthriving condition in my garden more than a year. Of Hybrid Bourbons, Charles Duval, Paul Perras and Paul Ricaut have been introduced, and found to thrive vigorously, but produce no flowers. Of the remaining three groups, I am not aware that I have seen a single Rose in this country. Examples—Adele Prevost, Mrs. Rivers, Pauline Garcia, General Jacqueminot, William Jesse, Victor, Hugo, Charles Duval, Etiole de La Malmaison, Queen of Denmark, Stanwell.

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ROSA RUBIGINOSA.

SWEET BRIAR—EGLANTINE.

Common in all parts of India; bears small pink, single flowers, does not bear the knife well, and will not blossom if pruned; can be propagated by budding, grafting. or sowing the seed, but rarely by cuttings. It produces seed which is gathered when quite ripe and sown immediately. It takes twelve or eighteen months to germinate

ROSA LUTEA (Syn. R. FŒTIDA).

AUSTRIAN BRIAR.

The only Rose of this group I have seen in India was one which, when I resided at Ferozepore, I obtained from Peshawar from cuttings conveyed in a letter, and nearly dried up by a five-days' journey in September. I removed several buds, which I inserted upon stems of the Rose Edouard. They nearly all took. It was a pretty variety, with sweet-scented leaves, and blossomed in March with a profusion of single, golden-yellow, rather evanescent flowers, but making for the time a most beautiful display.

Persian Yellow.—This is the only one of its group considered worthy of cultivation in England, bears deep golden-yellow, perfectly double flowers. It has been introduced into this country, but cannot be brought to thrive or blossom vigorously.

ROSA BANKSIÆ.

BANKSIAN ROSES.

Rosa Ternata.—A common plant about Calcutta; of rampant growth, with bright, glossy, dark-green foliage, contrasting prettily with its single pure white flowers.

White Banksian, from China, a plant with slender thornless twigs and long narrow leaves, is met with in the Calcutta Botanical Gardens, and bears in April bunches of very small, double, white, violet-scented flowers, but thrives very indifferently; will not bear pruning.

Yellow Banksian is also met with in Calcutta, but is rare. A conspicuous plant at Ootacamund.

FORTUNE'S YELLOW ROSE.

A rambling shrub with slender branches, of rapid and extensive growth, not to be confounded with the White Banksian Rose

Fortuniana; flowers described as large, double, with their petals loosely and irregularly arranged, of copper and fawn colour; introduced by Mr. Fortune, from China, into the Gardens of the Agri-Horticultural Society, but has never flowered, which possibly may be owing to its having been pruned. Messrs. Standish and Noble, the cultivators of it in England, say:—"The shoots should only be thinned; to shorten them is to destroy the flowers."*

ROSA MULTIFLORA.

A powerful scandent shrub; bears small pinkish flowers in February in crowded clusters; hardly worth a place in the garden, as plants take several years and become very large before they blossom, and do so then only sparingly. This though very similar to the Rose bearing the same name in England, is quite distinct from it. Both kinds are found at Ootacamund, where they form hedges, and blossom most profusely. I brought down thence the English variety to Chinsurah, but it succeeded there no better than the common kind.

The *Rosa multiflora* of the hills is of Japanese origin, and is sometimes spoken of as the "Japanese stock."

ROSA GIGANTEA.

A climbing Rose of rampant growth, very similar to the last; produces no flowers; used in Lower Bengal for stocks for inarching upon. Grows in Poona without flowering.

ROSA INVOLUCRATA.

A bramble-like plant, with small, pale yellow-green, pretty foliage; bears in February a profusion of white flowers like those of the Dog Rose; quite single.

DIVISION II.

DAMASK PERPETUAL.

Laurence de Montmorency.—A common Rose in the gardens about Calcutta, and certainly one of the most beautiful plants of dwarf habit; flowers large, double, cup-formed, of delicate blush colour; should be pruned freely: easily propagated by cuttings.

HYBRID PERPETUAL.

In England, the Roses of this group stand in the very highest estimation for the fulness, colour, and fragrance of their flowers, and some, but by no means all, for the continuance of their blooming. In this country they seem, it is true, when once established, to thrive vigorously, but in many instances are very shy of blooming; some do not bloom at all, and some others, that do produce very poor, unsatisfactory, flowers. This, no doubt, depends in a great measure on their lineage, as already explained.

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*Paxton's "Flower Garden," Vol. II, p. 457.

In Europe, these Roses are subjected to a severe pruning after they have completed their season's growth. This is sometimes done before winter; but more commonly, I believe, in the spring, when all shoots the plants have made during the past season are cut back to a third, or even a quarter of their length. This is equally essential in this country, and must by no means be omitted. It should be done about the middle of October. When in a healthy, vigorous condition, cuttings of nearly all of them laid down in November are not in the least difficult of propagation.

Geant des Batailles.—Is met with in several of the Calcutta gardens, but never in a very vigorous condition, nor bearing flowers to support the high reputation it once had in Europe. Far superior kinds of its class have quite supplanted it now. Mr. New, of the Government Gardens at Bangalore, pointed it out to me budded upon the Bussora Rose—much to its benefit, as he considered. It is not by any means difficult of propagation by cuttings.

Lord Raglan.—Said to surpass even the last in the beauty and dazzling brilliancy of its flowers, introduced by me; produced only poor valueless flowers.

Leone Verger.—A small compact bush, bearing a profusion of small, beautiful, cherry-coloured flowers; a delightful plant nearly constantly in bloom.

Marquisa Boccella.—A plant of small growth, remarkable for its very distinct and rich green foliage; flowers of moderate size, pale pink, very double, and imbricated, produced in the hot and rainy seasons: not very easy of propagation by cuttings.

Caroline de Sansal.—A beautiful pale rose-coloured flower, opening with its petals compact and crowded much in the manner of Souvenir de la Malmaison: established in this country, where it succeeds tolerably well.

General Jacqueminot.—A large, not very double, but most superbly brilliant Rose of a dazzling red: well established in this country, where it thrives and blossoms well, and is easily propagated among the finest we now possess. It is so profuse in its blooming that in England plants of it are cultivated by thousands for cut flowers for the market. Its bright colour, however, is rather fugitive.

Princess Adelaide.—(Not to be confounded with the old Tea Rose, to which this name is alone given in the English lists.) Flowers deep blush, large globular, rather single when full-blown, but

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exceedingly beautiful when half open ; a long-established favourite ; blossoms well only on plants three or four years old.

Enfant de Mont Carmel.—Flowers of moderate size, of rich deep crimson, with small compact and crowded petals; of a fine peculiar fragrance. Thrives, but not vigorously, here.

Duc de Nemours.—An old Rose in the Agri-Horticultural Society's Garden ; flowers crimson, of large, full, globular form.

La Reine.—An old Rose in the country, but still one of the most beautiful, producing large, deep rose-coloured, cup-formed flowers. Young plants do not blossom till two or three years old.

Pope Pius IX.—A plant of vigorous growth, but very shy of blooming ; puts forth towards the close of the rains one or two of its rather very small double flowers.

Madame Masoon.—A beautiful Rose, of moderate size ; flowers deep crimson, changing to violet ; thrives and blossoms well in the Agri-Horticultural Society's Garden.

Baronne Hallez.—A beautiful dark-red Rose, now long in the country.

The above, together with Madame Laflay, Jules Margottin, Baronne Prevost, Souvenir de la Reine d'Angleterre, and a few others have been long established in India ; but those that have been introduced since are so many that it would be vain for me to attempt to describe or even name them. Some years ago there was issued a notice of as many as seventy kinds, distributed by the Agri-Horticultural Society : out of these I find about twenty-eight, though once in high esteem, and good Roses withal, displaced in the English nurseryman's lists by others of superior merit. These lists are very extensive. It is well, however, not to be led away by them to a craving for too many, but to be satisfied with securing a few of the best. And hereupon I quote, as most deserving of consideration, what has been said by so eminent an authority as Mr. Rivers : "The New Hybrid Perpetual Roses annually sent out by the French florists make up a long list of names ; out of these, as a rule, but *very few* prove worthy of attention ; the greater portion are different shades of crimson—seedlings raised from General Jacqueminot—and fatiguing from their sameness of colour : among them all there is not one equal to Charles Lefebvre. Owing to this large annual introduction of quasi-new kinds, Rose catalogues have become burdened with an array of names tedious to read, and irksome to those who wish to select a few really good Roses."

I now give a list of the chief best kinds in cultivation, arranged according to their colours. I attempt no description, as, where all are beautiful, it were impossible to convey in few words any idea of the respective merits of each. Those who desire a more extensive list would do well to procure one from any of the principal Rose-growers in England.

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White.—Coquette des Blanches ; Louise Darzens ; Blanche Mareau.

Blush.—Baroness Rothschild ; Madame Rivers ; Madame Vidot ; Reine Blanche ; Thyra Hammerick.

Rose-coloured and Pink.—Abel Grand ; Charles Rouilard ; Charles Verdier ; Comtesse de Chabrilliant ; Josephine de Beauharnais ; *La France* (classed by some as a Hybrid Tea), Editor, VI edition ; Madame Guinnoiseau ; Madame Therese Levet ; Marguerite de St. Amand ; Marguerite Dombrain ; Monsieur Noman ; Reine du Midi ; Caroline de Sansal ; Elie Morel; Emille Hausburg; Madame Caillat.

Carmine.—Beauty of Waltham; Charles Margottin; John Hopper ; Jules Margottin ; Madame Alice Dureau ; Madame Charles Carpelet; *Madame Victor Verdier*; Marie Raddy; Paul Neron; Prince Leon; *Victor Verdier*; Ville de Lyon; Edward Morren; Nardy Freres ; Princes Louise.

Bright Crimson and Scarlet.—Alfred Colomb; Antonie Doucher ; Baronne Adolphe de Rothschild ; *Charles Lefebvre; Dr. Andry ;* Duc de Rohan ; *Duke of Edinburgh ; Fisher Holmes ;* Francois Lacharme ; Francois Treyve ; Camille Bernardin ; Duchesse de Caylus; Exposition de Brie; Leopold Hausburgh; *Marie Baumann.*

Dark Crimson.—Duke of Wellington ; Horace Vernet ; Lord Clyde Marechal Vaillant ; Pierre Notting ; Prince Camile de Rohan ; *Xavier Olibo ;* Francois Louvat ; Baronne Hausmann ; Monte Christo; Black Prince."

Thus far Firminger's original remarks and lists with one or two trifling additions by later editors. The editor of the sixth edition has marked in italics the varieties in the above list that are still popular in England. General Jacqueminot should certainly be included in the list. The following should be added : Frau Karl Druschki, white ; Suzanne Merie Rodocanachi, pink : Ulrich Brunner, cherry red.

BOURBON ROSES.

Firminger continues—"*Rose Edouard.*—Originally from the Isle of Bourbon, and parent of the whole group. An old well-known Rose in all parts of India, most desirable for the constancy of its bloom as well as for the sweetness of its flowers. During the cold season it produces flower-buds in unbounded profusion, which rot in the centre and never open. The stems, after blossoming, should be pruned closely. Exceedingly vigorous in growth, and easily propagated, affording the best stock we have for budding other kinds upon.*

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* For the history of this Rose see paper sent by Firminger to the Journal of the Agri-Horti. Soc., Vol. IV. Part II, N. S.

Gloire de Rosomanes.—A plant of large growth and sprawling habit, not uncommon in Calcutta ; produces all but single, large-petalled, brilliant crimson flowers, pleasing to those who care more for colour than for form; easily propagated by cuttings. Hedges are formed of this Rose in the Botanical Gardens at Ootacamund.

Pheolina Bourbonica.—A common Rose in Calcutta; bears a strong resemblance to the last in every respect, but produces flowers somewhat smaller and perhaps a little sweeter.

Armosa.—JIBON KISSEN PAUL'S ROSE ; somewhat similar to Pheolina, but producing its flowers, which are rather smaller, more double, and of better form, in crowded clusters ; produces a profusion of buds in the cold season, which never open.

Queen.—A lovely, fine-formed, flesh-coloured Rose ; thrives well in Calcutta, where it is now quite established.

Mrs. Bosanquet (called formerly, in the Garden of the Agri-Horticultural Society, Maiden's BLUSH, and known by native dealers as *Khura Peel*).—A plant of stout stems, but not large growth ; flowers large, white, the petals overlapping with beautiful regularity, as in a Camellia ; perfect in form, and one of the loveliest Roses we have : the plant does not bear much cutting in ; not very readily propagated ; but cuttings put down in November, in a shady place, will some of them strike. From its vigorous growth, and the much finer and fuller flowers it produces in this country, I was for some time unable to identify this rose. Following some, I have retained it among the Bourbons, though usually grouped among the China.

Acidalie.—A beautiful blush Rose ; bears a strong resemblance to Mrs. Bosanquet, but has petals more uneven with a deeper tinge on their edges. Not a very thriving plant in this country.

Pierre de St. Cyr.—Pale pink of moderate size, very beautiful. Thrives well and blossoms most freely in this country.

Prince Albert.—Described as a superb Rose, is found in some of the Calcutta gardens.

Marquis de Balbiano.—A plant of moderate growth. Flowers of medium size, very double, of a dazzling fiery-crimson colour.

Queen of the Reds (so named in the Garden of the Agri-Horticultural Society, and certainly not, as supposed by some to be, the French Rose D'Aguesseau). An old and common Rose in Calcutta garden ; plant not of large growth : flowers bear the strongest possible resemblance to those of the last.

Sir Joseph Paxton.—Introduced by me ; proved a stout-growing plant with large handsome foliage, and produced fine deep, dazzling crimson flowers.

Souvenir de la Malmaison—A most superb Rose, particularly lovely in the bud, which is large and blush-coloured.

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Most of the Roses of this group may, I believe, be reckoned as likely to thrive and blossom well in India. The following are the principal ones now found in the nurserymen's lists, arranged according to colour :—

White.—Baron de Maynard, Emotion, Madame, Gustave Bonnet, mademoiselle Emain, Marguerite—Bonnet. *Pink*—Baron Gonella, Catherine Guillot, Comtesse Barbantanne, Empress Eugenie, L'Avenir, Louise Margottin, Madame Charles Baltet, Madame Marechal, Michel Bonnet, Modele de Perfection. *Rose.*—Baronne Noirmont. Heroine Vaucluse, Madame de Stella. *Carmine.*—Jules Cesar, Rev. H. Dombrain, Dr. Berthet, G. Peabody."

This group is, on the whole, little grown in England now. Souvenir de la Malmaison and Mrs. Bosanquet are still popular as autumnal Roses, and Acidalie, Gloire de Rosomanes, and Madame Pierre Oger may be occasionally seen.

CHINA ROSES.

Firminger continues :—"The Roses of this group are more dwarf and compact in their growth than those of most other groups. All that we have in India—and I believe if Clara Sylvain, pure white and Fabvier, scarlet, be added we have all of any merit—thrive vigorously, are most easily propagated by cuttings, and, both as regards the profusion as well as beauty of the flowers they put forth, blossom in perfection.

Rosa Chinensis (*synonyms Rosa Indica, Rosa semperflorens*).—This species, the parent of the group, bears valueless single flowers and is altogether undeserving a place in the garden. The cultivated variety, however, called the China Rose, is a cheerful plant from the numberless pink blossoms it puts forth, though the flowers are thin and poor in form.

Eugene Beauharnais.—Flowers small, but very lovely when little more than half-expanded, perfect in form, resembling bright amaranth-coloured double Anemones.

Cramoisie Superieure.—Flowers large, completely double, the petals like satin velvet, of brilliant crimson scarlet, unequalled in colour by any Rose we have.

Archduke Charles.—(Known by the name of ROSADIS COLOR in the Gardens of the Agri-Horticultural Society)—*Dor-ungee.*—A plant of stout habit ; flowers noble, of the largest size, very double, petals very beautifully overlapping, almost white on first opening, turning to a dark dull-crimson a day or two afterwards.

China melior.—Flowers of moderate size and irregular form of a mottled dull red colour ; very uncertain.

Duc de berri.—Somewhat like the last, but the flowers smaller, darker and often disfigured by a decayed and black centre.

Madame Breon.—Of a brilliant rich rose colour, large and full.

Unique.—An old Rose in the Botanical Gardens, probably a seedling of this country ; a pretty free-blooming Rose of moderate size, with thick imbricated petals of a dull mottled crimson.

Le Cameleon.—Flowers described as whitish-pink, changing to blackish-crimson.

Lawrenceana—FAIRY QUEEN.—A diminutive plant ; flowers pink, of the form and size of double Daisy ; a variety also is met with, not uncommon, having flowers somewhat larger. This Rose makes no show in the border, and is best grown in a pot corresponding to its size."

Of the above Cramoisie Superieure and Fabvier remain popular. There are many new varieties of merit, of which Charlotte Klerum (red), Queen Mab (apricot and orange), and Comtese du Cayla (orange and carmine), may be mentioned.

Firminger continues :—

TEA-SCENTED.

"The Roses of this group, distinguished by their smaller growth, more delicate habit, and by the peculiar tea-scent of the flowers, are about the choicest and most lovely of all. They never, as the Hybrid Perpetuals often do, cause disappointment by producing no flowers, but, when well established and properly cultivated, are sure, in due time, of coming into bloom in great beauty. Indeed, those that we have in India seem to me to thrive far more vigorously, and blossom even more profusely and beautifully, than they do in England.

Booth's Rose.—A local name in Calcutta, supposed by some to be Goubault, but more probably Bougere, as delightful a Rose as we either have or could have in the country ; of strong vigorous growth, producing large exceedingly double deep blush flowers of delicious fragrance ; easily propagated by cuttings, and very common in the Calcutta gardens.

Wood's Rose.—A local name, the true name unknown ; very similar indeed to the last both in foliage and flower, but the flowers are scentless. Called by some Marshal Bugeaud.

Souvenir d'um Ami.—No Rose that I have seen in India can at all be compared for beauty of form with the large rose-coloured, drooping, half-expanded flower of this.

French White.—Its local name in the Gardens of the Agri-Horicultural Society, but certainly not appropriate as regards the colour of its flowers ; suppossed by some to be 'Maid of Athens' ; a

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bush of considerable size and very abundant foliage, bears in great profusion prettily-formed fawn-white very fragrant flowers of moderate size; very common in Calcutta, and easily propagated by cuttings.

Gloire de Dijon.—Accounted one of the very finest of the Tea Roses; flowers large, expanded, very double, with orange-yellow centre, the central petals crowded and crumpled. The colour in different specimens varies much, ranging from palest yellow through reddish orange up to pure red; an exceedingly strong-growing Rose, so much so as to be often trained to cover the side of a house; easily propagated.

Devoniensis.—Known commonly by the name of Victoria in gardens about Calcutta; one of the finest Roses in existence, producing fine large double creamy-white deliciously fragrant flowers, disfigured often by having a green but in the centre; of stout, vigorous habit; needs frequently to have the old wood cut out, which otherwise would die down and become unsightly; considered difficult to propagate. I have met with most success by putting down cuttings in the open ground beneath a low bush in the month of August—a season of the year when cuttings of other kinds seldom succeed.

Julie Mansais.—A small plant with pale yellow-green leaves, of delicate habit, and difficult of propagation; produces small pale lemon-coloured flowers, exquisitely beautiful when only half expanded.

Abricote.—Bears moderate-size flowers with apricot-coloured centre.

Safrano.—Called at Ootacamund, where it is exceedingly common, the Copper Rose, from the young stems as well as the dark-green leaves having much of a coppery tint; produces deep fawn-coloured flowers, beautiful only in the bud.

Comte de Paris.—Bears large flesh-coloured flowers.

Elise Sauvage.—Long known about Calcutta under the name of 'ODORATA'; produces large globular pendulous flowers, creamy-white outside and of a rich apricot-yellow within, without fragrance; one of the most lovely Roses known; though not able to bear severe pruning, it is apt to become crowded with a quantity of short spur-like wood, which it will be necessary to thin out: requires well manuring, and in the hot season frequent watering, or it will not thrive and blossom at all satisfactorily. Though many years in the country, it is a difficult Rose to obtain at Calcutta, except at a very high price. I have, however, found no difficulty in propagating it plentifully, more particularly as cuttings put down in the rains under any low bush will strike readily, as they will do also in the cold season; but is the later case they require frequent watering,

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La Sylphide.—A beautiful Rose, of moderate size, much like Abricote in colour; thrives well here.

La Boule d'or.—Flowers small, of a beautiful golden colour; the plant loves a dry soil.

Souvenir de David.—Flowers described as cherry colour, very large and double.

Vicomtesse de Cazes.—Flowers ornage-yellow, large and very double; one of the most beautiful.

Green Tea.—A dwarf Rose, common for many years in Calcutta, with dark glaucous foliage; produces beautiful, small, globular, pure-white, scentless flowers; and buds in the cold season, which do not open.

Beside the above the following, arranged according to their colours, comprise nearly all now in cultivation in England:—

White.—*Devoniensis, Climbing Devoniensis,* Madame Willermoz; Madame Bravy; Marquise de Foucault; Niphetos; Rubens; Souvenir de Mademoiselle Pernet; Triomphe de Guillot; Zelia Pradel; Irene.

Yellow.—Adrienne Christophle; *Belle Lyonnaise;* Bouton d'or; Coquette de Lyon; Comtesse de Brossard; Enfant de Lyon; Isabella Sprunt; Jaune d'or; Jean Pernet; La Boule d'or; Lays; L'enfant trouvé; Lousie de Savoy; Madame Cecile Berthod; *Madame Falcot;* Madame Levet; Madame Margottin; Madame Maurin; Mademoiselle Adele Jougant, Monsieur Furtado; Narcisse; Pactolus; Reine de Portugal; Vicomtesse de Cazes.

Fawn and Salmon.—Archimede; August Oger; Bougere; Due de Magenta; Madame Damaisin; Madame St. Joseph; Monplaisir; Pauline Labonte; Triomphe de Luxemburg.

Flesh and Blush.—Adam; Catherine Mermet; Eugéne Desgaches; Maréchal Bugeaud; Moire; Sombreuil.

Rose.—Comtesse Ouvaroff; General Tartas; Homer; Madame de Vatry; President."

Gloire de Dijon and those marked in italics are still popular in England.

Firminger continues:—

NOISETTE.

"The original of this group is stated to have been a cross between the Musk-rose and the common China, raised by the gardener whose name it bears. The varieties bespeak plainly enough their origin in the crowded trusses of small, very double flowers they produce; and some, Aimée Vibert, for example, in their distinct musk-like odour. Some are all but scentless. They are almost always in blossom, but in the height of their beauty perhaps in February.

Bridesmaid Lady Buller. Sir Walter Scott. Felenberg. Rod Noisette.—These four last throw up numerous shoots in the form of large rampant rods, which, if closely cut in, in October, will produce in February a great profusion of small red flowers; all easy of propagation by cuttings, and common in Calcutta.

White Noisette.—A small bush; throws up continually new shoots, which produce great densely-crowded heads of small white faintly-fragrant flowers, forming one entire mass of white blossom; requires close pruning: branches which have flowered should be immediately cut in; a very common Rose here; propagated easily from cuttings; plants need often to be renewed.

Caroline Marniesse.—A plant of straggling habit, produces clusters of small white flowers, with the crowded petals lapping completely over, somewhat resembling little Ranunculuses; propagated easily by cuttings laid down under shade of a low bush in November.

Aimee Vibert.—A beautiful white Rose; well adorned with fine, rich, verdant foliage.

The following comprise those which might be reckoned upon as certain of succeeding well:—

White.—Jeanne d'Arc; Marie Accary; Maria Massot.

Cream.—*La Biche.*

Yellow.—Bouquet d'or; Celine Forestier; Claudia Augustin; Earl of Eldon; Guiletta; Jane Hardy; *Lamarque Jaune*; Madame Caroline Kuster; Margarita; Reve d'or.

Red.—Du Luxemburg."

Aimée Vibert, and those in italics are still popular in England.

Firminger continues:—

TEA-SCENTED NOISETTE.

"The Roses of this group are usually combined with those of the last. They are, however, in many respects very distinct. This is at once discerned in the extended growth of their stems, their very much larger flowers, their Tea-like scent, and the smaller number of them borne in the truss. They are magnificent Roses, and, as from their origin might be concluded, well suited to the climate of India, as witnessed in the long established favourite Solfaterre.

Solfaterre.—Very common in the gardens about Calcutta; a plant of very extensive growth, requiring a stout bamboo trellis for its support; produces large handsome pale-lemon flowers, of strong Tea fragrance, at nearly all times of the year. The young stems, when mature, should be cut back a couple of feet, and the side shoots, which then break forth, will produce flowers. Apt to become crowded with small barren wood in the centre, which should be cut clean out ; requires plenty of water in the dry season ; propagated usually by layers, but cuttings also will strike freely. Mr. Errington does not consider this the true Solfaterre, of which plants have lately been received from England, but an inferior Rose. To me the difference is imperceptible.

Rajah—(*Lamarque?*).—A splendid Rose, in every respect similar to the last, except that the flowers are somewhat paler, and perhaps rather larger.

Jaune Desprez.—Flowers varying between buff and red, fragrant ; thrives and blossoms abundantly here, but the shoots are given to die back.

Canina Bourbonica.—One of the most beautiful, though one of the commonest and oldest Roses in Calcutta ; produces in greatest profusion large, handsome, pendulous, very double, though not well-formed, creamy-white flowers, with apricot centre, relieved most agreeably by the very peculiar and distinct yellow-green of the foliage ; benefited by liberal pruning ; considered difficult to propagate by cuttings. What the proper name of this Rose is I am at a loss to say. I conceived it might be Triomphe de Bolwyller. Canina Bourbonica (misprinted evidently for Chinensis Bourboniana) was the name originally bestowed by Redoute on Rose Edouard. How in Calcutta the name became transferred to this Rose it is now impossible to tell.

Maréchal Niel.—This noble yellow Rose has now become thoroughly established throughout India, and is one of the finest acquisitions to the garden. It is most vigorous in its growth.

Yellow.—*Cloth of Gold* ; Isabella Gray ; Mademoiselle Aristide ; Triomphe de Rennes.

Coppery.—Ophirie ; of brilliant foliage ; flowers untidy, but borne in great profusion."

Of the above Solfaterre, Jaune Desprez, Maréchal Niel, and Cloth of Gold still hold their own. Ophirie has been superseded by that most popular rose, William Allen Richardson ; which also does well in the Deccan.

Firminger continues :—

MUSK-ROSES.

"*Rosa moschatta*—*Séotee.*—Botanists seem to have decided that if not actually identical with, this is only a variety of Rosa Brunonii, a wild Rose of the Indian hills. Professor Koch says they are alike but for the hairiness of the latter. As found in the gardens of India, the Musk-rose is in general a dwarf plant, but its ordinary height elsewhere is stated to be six or seven feet. It is said that in Persia,

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trees of it have been seen as much as thirty feet high. It produces small flowers, with narrow, ill-formed, dirty white petals, and in the present day possesses little interest as a garden plant, except for its peculiar though not very strong fragrance, which, as its name denotes, is thought to resemble that of Musk.

ROSA LYELLII

ROSE OF THE DOON.

Koozea.

A plant of extensive growth, common in the Upper Provinces, but not met with, that I am aware of, near Calcutta; bears large handsome, double-blush flowers.

ROSA MICROPHYLLA.

A native of the hills of India; forms a large, compact bush, with dense, very pretty. small-leaved foliage; flowers double; well-formed, blush, with carmine centre quite scentless; much adorned by the large green, prickly calyx that surrounds them.

CLIMBING ROSES.

Very few of the Roses belonging to either of the Boursault, Ayrshire, or Evergreen groups, which, as climbing Roses, for their bright foliage and rich profusion of flowers, form in summer so conspicuous an ornament of the English garden, have, if ever introduced, been able to maintain a footing in India. It is upon the whole to the Tea-scented Noisettes that the gardens of Bengal at least must be indebted for their climbing Roses. The training, however, and pruning I prescribe is applicable, I believe, for climbing Roses indiscriminately. But it must be borne in mind that this does not apply to those of the Hybrid, Perpetual Roses that are sometimes trained to a great height, as Pillar Roses. They are none the more climbing Roses for being so trained. The property of all true climbing Roses is to send forth stems of great length, towards the ends of which shoots are emitted, which bear the flowers. If, then, these stems are much shortened, the lower portions of them which remain emit shoots, but these shoots bear no flowers. The mode of proceeding with them will then be as follows:—

1. Insert bamboo stakes in a circle round the plant. Cut out clean away to the ground all but three or four of the aforesaid long stems, train these three or four stems from stake to stake in a spiral form, and allow them to grow to their fullest length.
2. Cut all sprays and small wood at the bottom of these stems so as to keep them clear of wood a foot or two from the ground.

This will render the plant accessible for applying surface-dressings, which are of the utmost benefit.

3. When the stems become old, and show signs of debility, cut them out, and train new ones in their place.

4. The only pruning required, if any, will be just to take off about six inches from the end of the stem ; this will give greater strength to the flower shoots just below."

The Crimson Cluster, native of China, is an excellent climbing Rose and does well in the Deccan.

Dorothy Perkins and all the Wichuraiana class, so popular in England, grow well enough on the plants but do not flower. They are being tried on the hills.

RUBUS.

R. rosæfolius—A small, pretty plant with bramble-like foliage, native of the Mauritius ; flowers resemble small, very compact, double, pure-white, scentless Roses ; very common in the Calcutta gardens, and very troublesome for the numerous suckers it throws up to a wide distance around.

POTENTILLA.

Plants of the several kinds of Potentilla may be raised from seed in October, and kept with no great difficulty through the following hot season ; but the poor flowers they produce, if they blossom at all, are hardly worth taking the trouble for. Will do on the hills.

AMYGDALUS.

A. Persica—SEMI-DOUBLE CHINESE PEACH.—Sir J. Paxton says "has in all respects the habit of the common Peach. There are two varieties, white and red. Seedlings are said to come true from seed." Introduced by Mr. Fortune into the Agri-Horticultural Society's Gardens, and thus described by him :—

"These are very remarkable trees, common in the Gardens of Northern China, where they attain to the size of our English Almond. Nothing can be more beautiful than these when in full bloom. In the spring they are literally loaded with flowers, as large as our Scotch Roses. The Carnation-flowered has striped blooms resembling the Carnation—hence its name—and sports in a remarkable way producing striped and self-coloured flowers upon the same tree. As spring flowers they are highly prized by the Chinese. Itinerant gardeners carry them about the streets for sale in the northern Chinese towns. The flower-buds are then just beginning to expand. The buyer puts his purchase in a pot, gives it a little water, and then place it in his window or sitting-room. In a day or two the buds burst, and

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the little tree is one mass of bloom. They are propagated by budding and grafting, and will grow well in any common garden soil. I ought to add that small plants produce blossoms freely as well as large full grown trees."*

CERASUS.

C. Laurocerasus.—The so-called Laurel of the English gardens.

C. Lusitanica—PORTUGAL LAUREL.—Neither of these well-known evergreens exist, nor would, Firminger believed, be capable of existing in the climate of India.

CYDONIA.

C. Japonica.—This well-known, handsome flowering shrub Dr. Voigt mentions as existing in the Calcutta Botanical Gardens, and blossoming in the hot season. The plant is not to be met with now, but it might possibly find a congenial home at Ootacamund or perhaps on some of the other hill stations.

PHOTINIA.

P. dubia.—A tree of moderate size, native of Bengal; in full blossom in January, with an unbounded profusion of small clusters of small white flowers, which perfume the air for a great distance with the delightful fragrance of the Heliotrope.

Propagated by seed sown in October, or by cuttings put down about December.

RHAPHIOLEPIS.

R. indica.—A small, bushy shrub, native of China, with very handsome, dense foliage of oval, leathery, saw-edged, shining leaves, three inches long, exceedingly beautiful when in full blossom, in February, with its profusion of white flowers of the size and form of a thimble.

R. japonica integerrima and *R. ovata* are later introductions to our Betel-houses.

All are easily propagated by cuttings put down in January.

CRATŒGUS.

HAWTHORN.

None of the species of this genus can exist on the plains of India, but succeed well at our hill stations.

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*"Gardeners' Chronicle," February 1860.

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LEGUMINOSÆ.

THE PEA FAMILY.

It should be noted that this Order of herbs, shrubs, and trees, one of the largest of flowering plants, is usually arranged under three well-defined Sub-Orders :—

I. Papilionaceae.—Represented by the pulse crops of the country. Example : Pea.

II. Caesalpineae.—Mostly trees and shrubs with pinnate leaves and handsome, irregular flowers. Example: Gold Mohur.

III. Mimoseae.—With finely pinnate leaves and small regular flowers arranged in dense, showy heads or spikes. Example: Babul.

The Order contains nearly 7,000 species.

LUPINUS.

LUPINS.

Of these annuals there are a great many species and varieties, all more or less beautiful. The seeds should be sown in October in the spots where the plants are to blossom, as they bear transplanting very indifferently.

L. hirsutus.—The old, familiar, blue Lupin, with large, rough seeds. Sow in October, having first thrown the seeds into a basin of water and rejected those that float. Sow the sound ones by threes in a spot eight inches apart. The plants require scarcely any water, grow fast, and blossom considerably earlier than any of the dwarfer kinds. To save seeds, when the pods on the lower part of the flower-stalk have grown to nearly their full size, the tops of the stalks should be pinched off, and the plants carefully taken up and potted and placed in some shady place, where the seeds will ripen gradually and remain plump. If the plants are left exposed to the sun in the open ground, the seeds are apt to dry and shrivel up instead of ripening.

L. luteus.—The well-known, old, yellow Lupin with speckled seeds. The seeds are very hard, and should be soaked in hot water to soften them before being sown. Those, however, imported from England sometimes, according to Firminger, failed of germinating: and he recommended that care should therefore be taken when plants have been once raised to save seeds from for sowing the following season ; or seeds might with advantage be obtained from the Nilgherries, where in neglected gardens he saw this as well as other species of Lupin growing like a weed in great profusion, and ripening seed in abundance in September.

L. Menziesii.—Also a yellow Lupin, and very handsome. Dwarf in habit. Others are *L. Hartwegii*, with white and blue varieties;

L. mutabilis with part-coloured flowers, and *L. nanus*, a very delightful, little species. In addition there are many recently developed florists' varieties of considerable merit. The stiff spikes of flowers make admirable indoor decorations.

The shrubby and perennial Lupins are unsuited to the plains. But there appears to be no reason why they should not do well on the hills. The agricultural species from excellent green-manure to crops.

CROTALARIA.

RATTLEWORT.

There are many species, natives of this country, for the most part weedy-looking plants bearing yellow, Lupin-like flowers.

C. Juncea.—From which the common fibre, called *Sunn Hemp* or *Deccan Hemp*, is manufactured, is very pretty, and, when in bloom in the cold weather, much resembles the Broom of English gardens. Sow at the break of the rains on the plains, and in March on the hills.

C. pulcherrima.—With silvery leaves, and a grand display of golden-yellow flowers in December, is a fine shrub. Can be had in quantity at Bangalore.

LATHYRUS.

Firminger remarks : "*L. odoratus*.—Sweet Pea.—In the Upper Provinces the Sweet Pea, raised from imported seed, blossoms freely ; but in the vicinity of Calcutta though the plants continued to flourish vigorously till the approach of the hot season, they die off then, very often without having produced a single blossom. This I have experienced again and again. In the latter locality, therefore, none but acclimated seed, when procurable, should be sown, as this never fails of flowering abundantly. The seed should be sown in October in the places in the border where the plants are to blossom. Draw a circular drill with the forefinger, about ten inches in diameter, into which drop the seeds an inch apart. When the plants are half a foot high, sticks must be stuck in the ground for their support. On the hills the Sweet Pea comes to perfection, and should be sown in June and July to flower in the winter months, in a light, rich soil, in the place where it is intended to bloom. A writer in the 'Gardeners' Chronicle' states :

"There are several varieties of Sweet Peas : many years of observation have shown that the white-flowered Sweet Peas seldom, if ever, vary ; but that in proportion as the flower becomes darker in colour, so is the liability to vary greater." *

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* "Gardeners' Chronicle," No. 21, for 1860.

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"English Seedsmen's Catalogues contain a list of many varieties, and it is best, in my opinion, to get a packet of the choicest mixed, from which seeds should be saved for future sowing.

"And Mr. Darwin says :

"To keep up a mixed stock of even such extremely close varieties as the variously coloured Sweet Pea, they must be each year harvested separately, and the seed mixed in due proportions, otherwise the weaker kinds will steadily decrease in numbers and disappear." *

"In this country plants from acclimated seed produce scarcely any but pink and white blossoms. And if it be true, as stated in seedsmen's lists, that the black and purple varieties are natives of Sicily, and the light-coloured ones of Ceylon, it may be easily conceived how those congenial to the climate are preserved, and others die out.

"*L. magellanicus*—Lord Anson's Pea.—Between this and a common weed in Bengal, which bears small, bright blue flowers, there seems to be scarcely a perceptible difference.

"*L. tingitanus*—Tangier Pea.—I have often raised plants of this in my garden, but they never produced flowers."

"*L. latifolius*—Everlasting Pea.—Plants raised from seeds and placed in a sheltered situation during the hot and rainy seasons, I have known to be kept alive several years in the vicinity of Calcutta, but they have shown no tendency whatever to blossom."

The Sweet Pea grows admirably at Poona in the Deccan and its range can certainly be extended. It can be grown as a cold weather annual in the plains where there is no fear of frost. It seems to take a year or two to get really acclimatized, but, once established, flowers exceedingly well. If sown in September, it gets a good start in plains localities. It is best not to transplant, if this can be avoided, but to sow direct into the spot where the plants are required. The plant is a deep-rooting one, and the ground for it should be well dug 2 feet deep and manured for at least an inch deep. The plants benefit from pinching the main stem when 6 inches high. The plants should be staked up to twiggy branches stuck in the soil. Numerous florists' varieties of this plant are on sale by all seedsmen, and catalogues should be consulted for descriptions. Very admirable, waved and frilled varieties are available, including the well-known Spencer group. In England the National Sweet Pea Society has been formed for the sole purpose of improving and extending the culture of these beautiful flowers.

RHYNCHOSIA.

R. cyanosperma.—An indigenous woody twiner, well deserving of a place in the garden for its pretty racemes of bright-red or pure-

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* "Origin of Species," p. 76.

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white flowers. The roundish, violet-black, shining seeds are used as ornaments by the hill people.

GOODIA.

G. latifolia.—An Australian shrub of 3 to 4 feet. Evergreen, with small, Lotus-like leaflets and pretty, golden-yellow flowers, with a tint of red at the base. Easily raised from seed.

SPARTEUM.

S. junceum—Spanish Broom.—This small shrub, so well known for its cheerful, bright-yellow flowers, though rarely met with, may, with a little care, be preserved through the hot and rainy seasons. At Ferozepore, Firminger raised plants from seed brought from Simla, which survived the hot season and blossomed prettily.

ROBINIA.

LOCUST TREE.

R. Pseudacacia.—There are many varieties of this pretty tree in cultivation in Europe. But, except at a few hill stations, they are of no ornamental value in this country.

VIMINARIA.

V. denudata—Australian Rush Broom.—A large, Rush-like shrub, having long, terminal recemes of small, yellow flowers. More curious than ornamental. Only found in Botanical Gardens.

CYTISUS.

None of this genus can exist on the plains. Plants of the common Laburnum have, according to Firminger, been raised from seed, and kept through a hot season or two, only to dwindle away and die then without flowering.

C. scoparius—Common Broom.—This shrub is established at Ootacamund ; elevation 7,000 to 8,000 feet.

LOTUS.

BIRD'S-FOOT TREFOIL.

L. Jacobaeus.—A small, slender shrub, two or three feet high, with graceful, airy foliage of ternate leaves, leaflets narrow linear, an inch long, bears nearly at all times but in unbounded profusion in the cold season, four or five-flowered umbels of small, brilliant

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dark, chocolate coloured flowers, contrasting delightfully with the Venetian-green of the foliage. Not an uncommon plant in English gardens, but, as found there, it affords no idea of the beauty it attains to in this country. There is a variety with bright-yellow flowers. Easily propagated by cuttings laid down in the rains, or from seeds, which is the better plan. The plants do not display themselves to perfection till the second season of their growth.

ULEX.

U. europaeus.—Whin ; Furze ; Gorse. This homely shrub is domesticated both at Ootacamund and Kodaikanal. At the former place it is reported to be spreading rapidly.

GALEGA.

GOAT'S RUE.

G. orientalis.—A herb of 3 to 4 feet ; with long racemes of pretty, blue flowers. Hardy on the hills. Raised from seed, *G. officinalis* with blue flowers, and *G. o. albiflora* ; the white-flowered are also worth growing in the shrubbery.

BAPTISIA.

B. alba, white-flowered, and *B. minor,* blue-flowered are rather showy herbs rarely found in hill gardens. There are also species with yellow flowers.

INDIGOFERA.

INDIGO.

The plants of this genus are shrubs with pinnate leaves of very small leaflets. The species are very numerous, several natives of India. The following however, are the only ones perhaps sufficiently ornamental to merit admittance into the garden ; all raised from seed.

I. atropurpurea.—A shrub five or six feet high ; bears in the cold season numerous erect spikes of largish, fine, purple flowers. After having once flowered it becomes unsightly. It is best then to destroy it, and raise fresh plants from seed.

I. violacea.—A small shrub, three or four feet high, of exquisite beauty in the cold season, when blossoming with its racemes of small, rose-coloured flowers in unbounded profusion.

I. decora.—Described as "a dark-green, handsome bush, with flowers in large pendulous racemes of delicate pink or rose colour." Plants were introduced by Mr. Fortune from China some years ago into the Agri-Horticultural Society's Gardens, but did not thrive there, and have since perished.

I. tinctoria.—Doubtfully wild in India. The cultivated Indigo plant. Flower red. Plant 4 to 6 feet high. Best cut back to make an ornamental shrub.

I. australis, with rose-coloured flowers, is said to be a fine plant.

PONGAMIA.

KARANJ.

P. glabra.—A deciduous or sub-deciduous tree of moist situations especially near the sea-coast. Common in Mysore and Coorg, where it is well known and much planted as an avenue tree. With shining, green leaves, and, in the hot weather pendant recemes of lilac-rose to nearly pure-white flowers, half concealed in the leafy foliage, it is admirably adapted for the above purpose. The species comes into full leaf early in March, when other trees are mostly dormant, and is then an object of admiration and shelter to the weary traveller—*"Forest Trees, Mysore and Coorg."* In leafing, this tree assumes the most delicate tints of green, and can be seen a long way off. Easily raised from seed. From its seeds the Karanj-cake of commerce is made and an oil is extracted.

PSORALEA.

A genus of Cape plants, bearing recemes of beautiful, deep-blue flowers. Dr. Voigt says: "Several species have been cultivated here repeatedly, but without success." At Ferozepore, however, Firminger raised plants of two or three species, which blossomed prettily within a few months from the time of sowing. Psoralea corylifolia is a common weed in the Deccan.

AMORPHA.

A. fruticosa.—A small, Indigo-like shrub, bearing in March racemes of small, dark, bluish-purple flowers; met with in the gardens of the Agri-Horticultural Society.

TEPHROSIA.

T. candida.—A shrub of moderate size, with soft, agreeable foliage of pinnate leaves, with fourteen or more pairs of smooth leaflets of an ashy-grey colour on their under-surface; exceedingly beautiful when in full blossom in September and October, with numberless large, drooping, white, butterfly-like flowers. Propagated from seed.

T. grandiflora.—Introduced from Natal. An erect, free-flowering shrub of 3 to 4 feet. Flower reddish-purple and nearly as large as a Sweet-Pea flower, to which it bears some resemblance. Seeds freely.

T. purpurea.—An indigenous shrub with light reddish flowers: not so good as the preceding species.

DERRIS.

D. scandens.—A vigorous climber with pinnate, bright-green, stiff, rather leathery leaflets. Flowers pretty, rose-coloured, in long axillary racemes. Very effective, but needing a strong support. Raised from seed.

D. Heyneana.—A smaller but equally attractive plant, when in flower. Commonly found in the Mysore jungles.

WISTARIA.

W. sinensis.—A large, strong-growing climbing shrub, and well-known ornament on houses in England, with handsome, pinnate foliage; leaflets in four or five pairs, oval, acuminate smooth, those at the base three, and those at the apex four inches long; bears in the hot season large recemes of large, pale-purple flowers. In the climate of Calcutta it thrives indifferently, the stems being very apt to die back. Sir J. Paxton says that rigid pruning is indispensable to make it bear, on spurs instead of on big branches, and that plants cut down to within a short distance of the ground acquire a shrubby habit, and then produce flowers abundantly, having a most interesting and beautiful appearance. Succeeds well in Upper India, Propagated by layers. Writing from Ootacamund, General R. T. Baker describes this as the "most beautiful of all climbers, and sweet smelling." A white-flowered variety has recently been imported.

SESBANIA Syn. AGATI

S. grandiflora.—*Buko*—A small, very common tree, unsightly with its long bare stems, but producing very large, handsome, pendulous flowers of two varieties, white and red. Plants raised from seed come into flower within a year, when about three or four feet high, and when of that size are rather ornamental. After these have flowered it is best to destroy them, and then raise fresh plants from seeds. Dr. Voigt mentions a double-flowered variety, *S. coccinea* bears red flowers only. *Sesbania aegyptiaca* (*jait* or *shevri*) makes an excellent wind-break, and *S. aculeata* (called *dhaincha* in Madras) is used as a green manure.

CLIANTHUS.

C. puniceus—Glory-pay—Parrot's Beak.—A shrub of moderate size, bearing flowers somewhat resembling lobster's claws, two or three inches long, pendulous, bright-scarlet. This showy plant, though easily raised from seed, is immediately killed on the approach of the hot season. *C. Dampieri* is grown here successfully as an

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annual, and is a beautiful object when in bloom, with flowers similar in shape to the last, only larger, and of a more intense scarlet with black base.

SUTHERLANDIA.

S. frutescens.—A native of the Cape, a shrub very similar in character to the last, but smaller in every respect, with flowers not a quarter the size, but more numerous, and of a brighter scarlet. Plants are easily raised from seed, and keep alive with no great difficulty through the hot and rainy seasons, but never seem disposed to bear flowers in the plains.

SWAINSONIA.

A genus of pretty herbaceous plants about two feet high, with twining stems, and foliage resembling that of an Indigo plant ; natives of New Holland. Plants may be easily raised from seed procurable from seedsmen in England. Sow in June. They require shelter during the rains. They blossom here, but are not long-lived.

S. Galegifolia—Bears charming, Pea-like flowers of moderate size, of a delicate rose-colour, with a small, white spot on each wing in April.

LOUREA.

L. Vespertilionis.—A small, erect, herbaceous plant, two or three feet high, hardly to be considered ornamental but interesting for its foliage of curious, crescent-formed leaves. Flowers insignificant. Raised from seed in the rains.

URARIA.

U. macrostachya.—A small, shrubby plant, with pinnate leaves of oblong leaflets, three inches long, remarkably beautiful when in blossom in September, bearing erect a spike four or five inches high of crowded flowers of a delicate rose-colour. Raised from seed.

U. picta—Sunko jula.—A weed of this country, but pretty for its foliage of long, narrow, strap-like, pendulous, dark-green leaves ; bears in the rains long rigid recemes of small red flowers. Raised from seed in the rains.

DESMODIUM.

D. gyrans,—The Telegraph Plant.—A small, herbaceous shrub, about two feet high, with trifoliate leaves of smooth, oval leaflets, two and-a-half inches long ; interesting for the perpetual jerk-like motion with which the slender leaf-stalks move to and fro, but in nowise ornamental. Raised from seed in the rains. In the wild state, confined to damp forest areas.

DICERMA.

D. Pulchellum.—A small shrub, about three feet high, with trifoliate leaves, interesting both when in flower and in seed for the curious and pretty way in which the flowers, borne in long, erect spikes, are unfolded and concealed between two small orbicular leaves. Raised from seed in the rains.

CLITORIA.

C. Ternatia—MUSSEL-SHELL CREEPER.—One of the most common and at the same time one of the most beautiful creepers of our garden, though rather a rambling and untidy plant, and difficult to keep in order; leaves pinnate, with two or three pairs of oval leaflets. In blossom at nearly all seasons, with its handsome flowers sparkling smong the fine verdant green foliage. There are three or four varieties, one with the flowers of a deep indigo-blue, one with the flowers azure-blue, one with pure white flowers, and one with double flowers. Plants are raised from seed during the rains.

C. heterophylla.—A very beautiful little climbing pot-plant, with slender, thread-like stems, and delicate foliage of pinnate leaves, the leafllets varying curiously, some being of the size and form of a gum-wafer, and others of a narrow, oblong form: bears in the hot season pretty, small, pale-blue flowers. Raised from seed in February.

C. erecta.—A plant of upright growth, with thick, leathery leaves bears in the hot season large, handsome, pale-levender flowers. Raised from seed in February.

CENTROSEMA.

C. plumieri.—A large, twining plant of dense foliage with trifoliate leaves of large, ovate leaflets; bears in the hot and rainy seasons large, beautiful, pure, white flowers with a puce spot in the centre, the merit of which, however, is much lost from their lurking concealed in the foliage. Propagated easily by its rooted runners, or by seed, which it yields abundantly in the cold season.

C. virginianum.—Bears large, purplish flower.

CAMOENSIA.

C. maxima.—A rare and handsome climber from Angola. The largest flowered leguminous plant known as "Nicholson." Only rarely seen in India. Has trifoliate leaves, and bears in pendulous racemes of six to eight flowers, cream-coloured and veined, frilled at the margin, where they are also tinted with golden yellow. It is justly described as a gorgeously beautiful climber, and has few rivals. The calyx tube is about six inches long, with the sepals recurving like a Fuchsia, under which is the drooping corolla, about three inches long, each petal being frilled. It has as yet only been grown in a grass conservatory; but it may be got in time to grow in the open. It does well in a soil consisting of rich loam and leaf-mould in about equal parts. Propagated by layers put down in the rains. On the hills it would doubtlessly need the protection of glass.

ADENANTHERA.

A. pavonina.—This grows into a large forest tree (The Red Wood Tree), but when kept well pruned it forms a handsome bush, bearing spikes of small, yellow flowers.

The beautiful scarlet seeds, each weighing four grains, are used as weights as well as for ornament.

Raised from seed. Indigenous to the dry range of the Western Ghauts.

BUTEA.

B. frondosa—Dhak or Palas.—Medium sized: deciduous in the winter: leaves preceded in February and March by a gorgeous display of orange-crimson flowers in dense fascicles. This fine tree should find a place in every large-compound. It grows readily from seed. It is the true "Flame of the forest." *B. superba* is a woody climber, but in other respects nearly the same as the preceding species.

KENNEDYA.

A genus of slender, climbing plants from Australia, some bearing a strong general resemblance to Runner-Beans. They are easily raised from seed sown in the rains, but in the vicinity of Calcutta they never bear flower, nor can they for any length of time be kept alive there. In Upper India, however, they succeed well.

ERYTHRINA.

E. herbacea.—A small shrub about two feet high; bears in March racemes of crimson scarlet of moderate size; the loss of its leaves during the time of flowering detracts greatly from the beauty of this plant.

E. Blackei.—A rare plant; considered the most beautiful of the genus, bearing in April flowers of the most brilliant scarlet colour.

E. indica—Pahta Mundur, Pangora.—A tree of moderate size, very common in hedgerows about Calcutta, as well as in the other parts of India; exceedingly showy, when in March it becomes a perfect blaze with its handsome clusters of large, brilliant-scarlet flowers brone at the ends of its stems, being perfectly leaflets at the time if in a place where the water-supply is stopped. A white variety is known, and there appear to be several sub-varieties of the red. Cuttings of this plant 6 feet long by 3 inches across root readily when planted, and are used as live supports for Grape Vines at Nasik in the Deccan.

E. Hendersoni.—A small shrub in the Calcutta Botanical Gardens; has been several years there, but has not blossomed.

E. crista-galli—Cock's Comb; Coral-Tree.—A small shrub; bears during the hot months large, erect, clusters of rather dull-crimson flowers, not nearly so fine in colour as some of the foregoing, but more ornamental, from the plant being in full leaf at the time. The stems die back in the cold-season, and should then be well cut in. "The great roots," it is said "may be taken up at the end of autumn and kept in the manner of Dahlias, and replanted, in the open ground in the May following."[*] Sir J. Paxton says it is "one of the finest of exotics, and an inestimable ornament," and that it is a good plan to "plant it in suspended baskets"; that "it requires a light soil and good drainage, as it will not endure much moisture."[‡] Plants, however, thrive well in the open border in our Indian gardens, and, moreover, when in flower do not seem to merit the high praise here bestowed upon them. Propagated from cuttings, or raised from seed during the rains.

E. corallodendron—Red Bean Tree.—A small, bushy tree and most superb ornament to the garden, when in February and March it bears in profusion its sprays of large, dazzling flowers of brilliant red, contrasting beautifully with its abundant foliage of verdant-deep-green leaves. Of rapid growth, and propagated readily from seed during the rains.

E. Bellangerii.—Lately introduced.

E. laurifolia.—A dwarf plant, with laurel-like leaves bearing brilliant-scarlet flowers. *E. Parcellii* has yellow markings along the veins and is ornamental. Otherwise like *E. indica*, *E. stricta*, and *marmorata* are recent introductions, and are of dwarf growth, being on that account valuable additions to our garden favourites of this genus. Most of the foregoing can be propagated by cuttings in sand during the rains, while those bearing seed can be raised by sowing during the rains.

E. lithosperma—A thornless evergreen tree. Very ornamental while in flower, during the rainy season. Easily raised from seed. Under the name of *Dadaps* it is grown in Ceylon and its loppings used as green manure.

E. umbrosa—Mother of Cocoa.—An ornamental tree of the West Indies. Established in public gardens.

E. Humei, *E. Caffra* and *E. latissima* are species introduced from S. Africa.

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[*] "Le Bon Jardinier."

[‡] "Sojourn in Jamaica."

MUCUNA.

An Indian genus of twiners, some of which bear very remarkable clusters of dark-purple, nearly black flowers.

M. pruriens.—Cowage. The oval flattened pod of this plant is densely covered with irritating hairs or bristles. Flowers purple in dense, drooping racemes. An annual plant raised from seed. *M. monosperma* and *M. atropurpurea* are perennial woody climbers of vigorous and extensive growth. But the dark flowers and pilose pods are very interesting. All seed abundantly.

PHASEOLUS.

P. Caracalla—Greek Creeper—Small-Flower.—An interesting twining pot-plant : bears in August large, handsome, white flowers, tinted with rose colour ; the unexpanded buds having a curious resemblance to snail-shells. Raised from seed in the rains.

FLEMINGIA.

F. strobilifera.—A small shrub, with ovate leaves; flowers small and insignificant, but arranged in a curved raceme, each overlapped in a most curious way by a large pair of kidney-formed inflated leaves. Raised from seed during the rains.

F. Chappar.—A small shrub ; bears its flowers in the same curious way as the last, and is distinguished from it by its heart-shaped leaves. Both are very ornamental when in blossom. Raised from seed during the rains.

ABRUS.

A. precatorius—Wild Liquorice—*Gungchee*—A creeping herbaceous plant, the principal interest of which consists in the pretty little seeds it displays in its open seed-pods. These are egg-shaped, quarter the size of a Pea, of a bright scarlet colour tipped with black. They are used as weights by goldsmiths, and are often strung in the manner of beads for necklaces. There is a variety with white seeds resembling ivory. The flowers are small, pale purple and not interesting. Raised from seed during the rains.

DALBERGIA.

D. Sissoo—This, though a common jungle tree, and unsuited for the garden, deserves a place in some out-of-the-way corner for the fine fragrance with which its profusion of small greenish-white flowers perfume the air in the evening. The timber is excellent. There is also a variety with drooping branches like the Willow *D. lanceolaria D. melanoxylon, D. sympathetica* and *D. latifolia* are all good.

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SOPHORA.

S. tomentosa—A large shrub with handsome pinnate foliage of about fifteen or more roundish oval leaflets : bears in June and July large erect clusters of bright-yellow flowers, somewhat similar to those of the Laburnum ; very showy. Raised from seed during the rains.

S. Violacea.—A pretty, Indigo-like, small shrub, bearing in October recemes of violet-coloured flowers with a dark eye ; recently introduced. Raised from seed sown in August.

VIRGILIA.

V. aurea.—A pretty little shrub with pinnate leaves of about ten pairs of oval smooth leaflets ; bears yellow. Laburnum-like clusters of flowers in the cold season. Raised from seed sown in September.

V. Capensis.—A tree of some size ; bears in boundless profusion pale-purple and white flowers, emitting a most delightful fragrance ; thrives well in the Nilgherries, where it is perpetually in blossom. Dr. Voigt says that it has been cultivated near Calcutta but without success.

CASTANOSPERMUM.

C. Australe—Moreton Bay Chestnut—An Australian tree of considerable size ; thrives well in the Bangalore Public Gardens, where in March it produces its large crimson, beautiful flowers. Small plants of it only are to be met with about Calcutta, although it is many years since it was first introduced. Slow growing but one of our best evergreen trees. Seeds freely.

HAMATOXYLON.

H. Campechianum—Logwood.—A slender tree, about ten feet in height, with small shining leaves, and of very light and elegant growth. Flower small, yellow, borne in vast profusion in February in small catkin-like racemes, very fragrant and beautiful, Mr. Gosse observes :—"The likeness of this tree to the Hawthorn of Europe is very striking, and has been noticed by many. A stranger might infallibly mistake it for that familiar tree" * Propagated by seed and cuttings in October. It forms an admirable hedge and wind-break up to 10 feet high.

PARKINSONIA.

P. aculeata—Jerusalem Thorn.—A tree-like shrub, from 15 to 20 feet high, remarkable for the clear, vivid, polished green of its trunk and stems, with pinnate foliage of minute leaflets, nearly

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* "Sojourn in Jamaica."

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always in blossom with recemes of small yellow flowers. Don considers it "a most elegant shrub when in flower" ; but in this country, where it is so common, few possibly will entertain the same high opinion of it. In the North-West of India, on account of its rapid growth, as well as for its thorns, it is often employed for hedges. It is, however, regarded as very baneful to other plants growing near it. Propagated from seed in the rains.

POINCIANA.

P. pulcherrima (synonym Caesalpinia pulcherrima).—Peacock-Flower—Barbadoes. Pride—Flower-fence—*Krishchurun.*—A large thorny shrub with bipinnate foliage of oblong leaflets ; bears during all the hot and rainy seasons, at the end of its stems, considerable-sized panicles of large showy flowers. There are two varieties—one bearing yellow, and the other scarlet flowers. It should be cut in closely in the cold season, as it is apt to grow very straggling, and the old stems look decrepit and unsightly. But the better plan perhaps is to destroy the old plants altogether, and raise fresh ones from seed. It hardly bears the cold of the Punjab, but thrives there during the hot months better perhaps, than in Bengal. I have seen plants there, eight months from the time they were raised from seed, produce immense, erect, tuft-like recemes of blossom, so compact as to quite conceal the flower-stalks, being then objects of great beauty. In the veriety *lutea* the flowers are orange-yellow. Often found in temple enclosures. Sow the seed in the rains.

P. elata.—A medium-sized tree, native of Coromandel, bears in the hot season recemes of large, pale yellow flowers, with reddish filaments of ample dimensions. Propagated from seed during the rains.

P. Gilliesii.—A small shrub, three or four feet high, native of Mandoza, with remarkably pretty, feathery, bipinnate foliage of minute leaflets : bears during the hot and rainy seasons panicles of large flowers with pale-yellow petals, which rarely expand, but from out of which proceed very long crimson stamens. Sir W. Hooker speaks of it as "a charming plant." After two seasons it is apt to decay and look unsightly ; it is therefore best to raise fresh plants every year from seed, and throw the old worn out plants away. When in seed the seed-pods should be covered, before half-grown, with muslin, to protect them from the ravages of an insect which rarely fails otherwise to penetrate them and destroy the seed. Sow in the rains.

P. regia—Gold Mohur.—A large tree, native of Madagascar, called by the French the Flamboyant. When young, the foliage is very handsome. Bears in April and May immense Panicles of large secarlet and yellow flowers. There appear to be several types, differing in the shade of colour of the flowers. In most places where it is grown, all variations from brick red to deep crimson may be seen. It is exceedingly rapid growth, very apt to be damaged by strong winds, and apparently of not long duration. Propagated from seed, which it bears abundantly. Sow in the rains.

CAESALPINIA.

C. coriaria.—A small spreading tree, hardly suited for the garden, but well deserving a spare place in the outskirts of it, for the most delightful aromatic odour diffused by its recemes of small flowers when in full blossom in October. This is the "Divi-Divi," or American Sumach. It is quite a distinct class of tree, being umbrella-shaped and of very dark-green foliage. The twisted pods are very valuable for tanning. An excellent tree for the compound. The flowers are pale yellow, in clusters. Propagated by seeds.

C. Grahami.—A handsome, exceedingly thorny shrub, seven or eight feet high, with deep, verdant green, dense foliage of pinnate leaves, of six or seven pairs of oblong leaflets, two and-a-half inches long; throws out, principally from its summit, in the cold season dense, solid-looking, tapering, brilliant-coloured spikes ten inches long; the opened flowers at the bottom of the spike yellow, and the unexpanded buds towards the end of it of a rich scarlet crimson. A truly superb object durig the long time it continues in blossom. Propagated by layering.

C. paniculata.—Hooker describes this as "a magnificent climber, festooning the trees with its dark glossy foliage and gorgeous recemes of orange blossoms." Dr. Voigt says the flowers are fragrant, and are borne in the cold and hot seasons.

C. sepiaria.—The Mysore Thorn.—A robust thorny scandent shrub suitable for fencing. The large recemes of canary-yellow flowers are very charming. Raised from seed.

C. sappan.—Sappan Wood Tree.—A small thorny tree, the heartwood of which turns red on exposure and affords a useful dye. Ornamental when laden with its large panicles of yellow flowers.

COLVILLEA.

C. racemosa.—A large tree, thirty feet high or more, native of Madagascar, with handsome pinnate foliage of very small linear leaflets; bears in September, principally at the end of the branches, large, drooping, cone-like recemes of bright orange-coloured flowers, presenting then a very noble and showy appearance. Propagated from seed.

CASSIA.

A rather numerous genus, consisting mostly of trees of shrubs: only a limited few of a sufficiently ornamental character to merit a place in the garden. Nearly all easily propagated from seed.

C. fistula.—Pudding-pipe Tree—*Amultas*—A small tree common all over India, with noble, dense dark-green foliage, of broadly ovate large leaflets ; bears, when in blossom in May, considerable resemblance to the Laburnum. It has "the foliage of the Ash and the inflorescence of the Laburnum," according to Dr. Masters. Roxburgh well describes it as "uncommonly beautiful when in flower, few surpassing it in the elegance of its numerous long pendulous recemes of large bright-yellow flowers, intermixed with the young lively green foliage."

The flowers have a faint and delicious odour. Remarkable also for its curious cylindrical black seed pods, as much as two feet long.

C. marginata.—A small tree with widespreading branches and graceful small-leaflet foliage ; remarkably beautiful in the hot season, when in blossom, with its profusion of racemes of small rose-coloured flowers, looking at some distance off like the flowering Ribes. Major Drury considers it "something like the Weeping Ash." A common plant on the Madras side, but I have not noticed it in the gardens about Calcutta. Dr. Wight says it is so nearly allied to the following as to the frequently confounded with it. A most graceful evergreen tree, with the lower branches sweeping the ground. Flowers rather dull rosy-red, borne in great profusion in June and July and lasting for a month. Plentiful at Bangalore, where it is propagated from seed.

C. Javanica.—C. bacillus of Roxburgh, who describes it as a native of the Malay Islands, blossoming in the hot season with racemes of flowers of a lively pink or rose-colour, and says, "when in flower, it is by far the most beautiful Cassia I have yet seen."

C. Florida.—Dr. White describes this as "a small but beautiful tree, particularly when in flower, every branch of it terminating in a large panicle of deep yellow blossoms." It is in flower at nearly all times of the year. *Syn. C. Siamea.*

C. glauca.—A very common small tree with widespreading branches ; bears during the latter half of the year racemes of large sulphur-coloured flowers.

C. Australis.—A shrub of about ten feet in height, very ornamental for its deep green, handsome, small-leaflet foliage, and the spreading habit of its branches, but of extraordinary beauty when in full blossom in October, and profusely covered with its large close recemes of bright golden flowers.

C alata.—*Dad-murdun*—A remarkably stately shrub of spreading habit, and occupying a considerable space of ground, with noble foliage of great, obovate, oblong leaflets : extremely handsome when in full blossom, in the cold season ; it lifts aloft its great terminal cone shaped recemes of closely-packed, large, deep-yellow flowers. The ringworm plant.

C. auriculata.—A small, very common shrub, with dense agreeable foliage, easily distinguished by the ear-like appendage between each pair of leaflets ; ornamental when in blossom in the cold season, with its abundant large yellow flowers. An inhabitant of dry salt land. Its bark is used for tanning.

C. Macræi.—A small shrub with pretty delicate foliage ; ornamental when covered in profusion with its small golden flowers.

C. floribunda, *C. sophora*, *C. marylandica*, and *C. tomentosa*, all having yellow flowers, are useful garden shrubs.

BROWNEA.

A genus of flowering shrubs or small trees, of unrivalled splendour, in character and foliage bearing a strong general resemblance to the Amherstia, but totally unlike that noble tree in the appearance of their blossoms. The three species described below thrive and blossom exceedingly well in gardens about Calcutta. They are propagated by layers. Natives of the shady thickets of the West Indies.

B. ariza.—A shrub or small tree ; bears in March from the end of its stems, which it drags down by its weight, a cluster of blossoms of prodigious size, much resembling a bunch of Rhododendron flowers ; of a fine deep rose colour, and of extraordinary beauty.

B. grandiceps.—Sir J. Paxton writes of this and the preceding:

> "Their flowers are produced in a short spike, tier above tier every day witnessing the expansion of a new tier above those of the former days, till at last the whole mass becomes a globe of living and glowing crimson. This brilliant head appears on the side of the main stem among the leaves. Every evening they rise up and lift themselves from the blossoms to expose them to the dew, so that each morning these beautiful objects lie uncovered; but as day advances, the leaves gradually droop and bend down over the flowers to guard them from the rays of the sun."*

B. coccinea.—A small tree, eight to ten feet high, of handsome compact growth. Bears in March smaller heads of flowers than the preceding, but more numerous, and of a bright scarlet colour, exceedingly gorgeous and dazzling. They diffuse a faint sweet odour for some distance.

B. antiguiensis is likewise now found here.

AMHERSTIA.

A. nobilis.—This celebrated tree has been described as about the most beautiful object in the whole vegetable creation ; and certainly, when in full blossom in February and March, asserts its claim to be considered so. The immense, pendulous, candela-brum-like clusters of fine red and yellow flowers, drooping from all parts of the tree among the handsome foliage, present an appearance of

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astonishing elegance and loveliness. When out of blossom, it is highly ornamental for its fine hanging foliage of pinnate leaves, with six or seven pairs of lanceolate pointed leaflets seven inches long.

It was first brought into notice by Dr. Wallich, who introduced it from Martaban, though there seems considerable doubt whether that is its native locality. It has now become pretty well established in several of the gardens in the vicinity of Calcutta, far north of which it would in all probability be unable to exist.

It is propagated easily by laying ; but the young plants, when put out in the spot selected for them, require great care, or they are sure to die off. The late Mr. John Scott was of opinion that the best time for laying is in the hot season soon enough for the layered plants to be taken up and put out in the rains. Layers made in the rains and taken up in the cold season he found nearly sure to die. During the cold months they should have a screen over them to protect them from cold at night ; and during the succeeding hot months they need one quite as much in the day time to shelter them from the dry arid heat of the sun. At the latter period also, being in vigorous growth, they should be constantly watered. The rainy season is the one most congenial to their nature, when they may be safely left to themselves. They luxuriate in an exceedingly rich soil, and are benefited in their growing season by copious supplies of liquid manure.

SARACA Syn. JOANNESIA.

S. indica—Asoca-Britch.—An evergreen tree of considerable size, native of Southern India, somewhat similar to the preceding in foliage, but very dissimilar in its mode of flowering; blossoms in February and March with large, erect, compact clusters of flowers, varying in colour from pale-orange to scarlet, almost to be mistaken on a hasty glance, for immense trusses of bloom of an Ixora. The flowers emit a faint sweet scent for some distance around. Mr. Fortune considered this tree, when in full bloom, superior in beauty even to the Amherstia—an opinion in which probably many will not concur.

Firminger remarks : "The first time I saw the Asoc in flower was on the hill where the famous rock-cut temple of Kârlee is situated, and a large concourse of natives had assembled for the celebration of some Hindoo festival. Before proceeding to the temple, the Mahratta women gathered from two trees, which were flowering somewhat below, each a fine truss of blossom, and inserted it in the hair at the back of her head, which she had seemingly combed and dressed with uncommon care for the occasion. As they moved about in groups, it is impossible to imagine a more delightful effect than the rich scarlet bunches of flowers presented upon their fine glossy jet-black hair."

The tree yields seed in abundance, from which young plants are easily raised.

BAUHINIA.

CAMEL'S FOOT.

Mountain-Ebony.

A rather extensive genus of shrubs and trees, several natives of this country, and all remarkable for the peculiar form of their leaves, which are composed of two oval leaflets, laid side by side, and having their edges near the base united. In consequence of this twin-like union, the genus has been fancifully named by Plumier after the two brothers Bauhin (celebrated botanists of the sixteenth century), as being symbolic of the united labours of the brothers in the cause of science. Some few of the species are very ornamental and well deserve a place in the garden. They all bear seed, from which they are easily propagated.

B. Richardiana.—A small tree, about ten feet in height, very ornamental when in blossom in April, with its numerous large flowers, having four of their petals white speckled with red, and the other petal—the lower one—crimson, with a few stripes of white, and altogether resembling those of a handsome Geranium.

B. aurantiaca.—A small tree; bears in April tawny orange-coloured flowers; of but little merit.

B. acuminata.—A small tree, about ten feet high, very handsome from being nearly always in blossom with its numerous large pure white flowers. Roxburgh quaintly remarks, "It is a very specious plant, well deserving a place in the gardens of the curious."

B. tomentosa.—A small tree, about eight or ten feet high, all the tender parts, except the upper surface of the leaves, covered with a soft down; almost constantly in blossom with beautiful, large, pale, sulphur-coloured, drooping flowers.

B. retusa.—A considerable tree. blossoms in September with corymbs of numerous small pale yellow flowers, beautifully marked with numerous small purple spots.

B. purpurea.—A large stout tree; bears in November, in racemes, numerous, very large, deep-rose-coloured flowers.

B. triandra.—A large tree; bears in November recemes of large white flowers. Roxburgh says:—

> "This, when in flower, is one of the most beautiful species of Bauhinia I have yet met with; and as it blossoms when so low as three feet, and when not more than one year old, is particularly well adapted for the conservatory."

Dr. Wright expresses himself as all but convinced it is no more than a variety of *B. purpurea.*

B. variegata—Kuchnar.—A rather large tree ; an object of great splendour when, in February, it becomes one entire mass of purple and white blossom, the large and handsome flowers having a strong resemblance to those of a Pelargonium.

B. monandra : rather like B. variegata, but has only one fertile stamen.

B. candida.—A variety of the last, bearing flowers with white and pale yellow petals.

B. Vahlii.—This gigantic woody climber needs a roomy situation to itself. A plant growing in the Lal Bagh at Bangalore, has not only coiled itself around several large stone pillars in the most marvellous manner, but has extended over a trellis work of the same material for more than fifty yards. The large flowers are a dirty yellow to straw colour. The brown pilose pods are very interesting. Raised from seed.

B. phœnicea.—As seen in the wild state on the lower (western). slopes of the Western Ghauts, this is a most magnificent climber, the young shoots lying in crimson masses upon or suspended in beautiful festoons from the highest trees.

B. Galpini.—A fine species recently introduced from S. Africa. Naturally a woody climber, but can also be trained as a large bush. The large flowers which appear two to three times during the year, are of a showy crushed-strawberry colour. Easily raised from seed.

B. corymbosa.—Native of China ; a small scandent, and, irrespective of its flowers, most charming shrub, with exceedingly slender stem and very small pretty leaflets, the pairs not at all adherent, as in other species ; bears in April middle-sized rosy-white fragrant flowers.

B. diphylla.—A very pretty scandent shrub, somewhat similar to the last, but of stouter growth ; bears in June and July middle-sized creamy-white flowers.

PARKIA.

P. biglandulosa.—A handsome evergreen tree named after the African traveller, Mungo Park. Cultivated in gardens, and occasionally at the road-sides in Bangalore. The inflorescence consists of pendent, globular, flower-heads, suspended on long peduncles. At first the heads are of a brown velvety colour, changing to a darker hue, but when the flowers open they become white, and trees laden alternately with these white and dark balls are extremely interesting. A fine avenue tree. Easily raised from seed.

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C. canadensis and C. siliquastrum—JUDAS-TREE.—Mrs. Loudon says :—

"Few trees are more ornamental in a shrubbery than these two species ; but *C. siliquastrum* is decidedly the handsomest. The leaves are curiously shaped, and flowers, which are of a beautiful pink, grow out of the bark of the stem and branches, unlike those of other plants, among the leaves. The flowers fried in butter make excellent fritters."

Dr. Voigt states that *C. canadensis* had been in the Calcutta Botanical Gardens sixteen years without flowering.

GLEDITSCHIA.

G. tricantha—HONEY-LOCUST.—"Though of American origin, commonly known now in Italy by the name of Spina Christ." * A large tree that takes its name from the great pods it bears, containing a thick, sweet, glutinous pulp ; as met with here, a shrub in no respect ornamental but for its rather pretty small foliage ; but this it loses for a long time during the cold season ; bears inconspicuous greenish flowers ; for its formidable thorns better adapted for a hedge than for the decoration of the garden.

DESMANTHUS.

D. punctatus.—Firminger remarks :—"A small shrub, native of Brazil, of prostrate growth, and very sprawling, remarkable for the extreme sensitiveness of its pinnate foliage ; pretty when in blossom, with its tassel-like rose-coloured flowers of the size of a bullet ; yields seeds plentifully ; except in not being an aquatic, resembles in every respect *D. natans* ; such at least is the description of plants raised from seed sent me from the Calcutta Botanical Gardens, but I have doubts as to the accuracy of the name."

MIMOSA.

M. pudica—SENSITIVE-PLANT—*Chooee-mooee*.—Native of the West Indies. Very similar in every respect to the preceding, except that it is much smaller and of more slender habit ; a very common and pretty plant, but in parts of the south of India it has become an obnoxious weed, covering large areas ; nearly always in blossom ; seeds abundantly, from which it can be raised easily. It responds to touch by folding and drooping its leaves. A severe stimulus, such as a burn, is transmitted down the stem and the leaves droop in succession.

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* "Gardeners' Chronicle," April 12, 1862.

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M. brevipinna.—A small shrub, of erect growth, ornamental for its exquisitely delicate and beautiful pinnate foliage of minute leaflets ; requires to be well cut in to keep it bushy, otherwise it is disposed to grow with long, bare, unsightly stems ; but very slightly sensitive.

ACACIA.

The number of Acacia species is large. A great many are natives of Australia, and objects of extreme beauty, both as regards their flowers and their foliage. Many Australian species are remarkable for being without true leave, and developing their petioles into the form of leaves, called then "phyllodia," which have the peculiarity of always directing their edges to the earth and heavens. Some few of these may be met with at Ootacamund, growing well there ; but not one has been found capable of enduring the climate of Bengal. In the Punjab they thrive well. The several species that are natives of India have no pretensions to beauty, being, for the most part, rough jungle plants quite unfit for admission into the garden.

A. cornigera.—A small shrub, not ornamental, but curious and interesting for the remarkable large tumid hollow thorns, resembling little horns, with which the stems are thickly covered.

A. modesta—Phulaee.—A small shrub, common in the north-west, where it forms, when kept well cut, a neat and pretty hedge.

A. catechu.—A large tree, with small and very delicate foliage of bipinnate leaves ; the leaflets arranged like the teeth of a small comb ; if cut closely in, well adapted for affording a very pretty hedge.

A. farnesiana—SWEET-SCENTED BABOOL.—A small unsightly, thorny, jungle-tree ; but very acceptable when in blossom in the cold season, and covered with its profusion of bright yellow tassel-like flowers of the size and form of a bullet, which emit far around a strong, delightful, aromatic fragrance, much resembling that of Wall-flowers, and retain their scent long after gathered and laid by. At Cannes, in the South of France, the tree is submitted to a very careful system of cultivation and training for the sake of its flowers, which are in great request with perfumers. In the dry districts of India it makes an admirable hedge if pruned severely to thicken it.

A. speciosa—SIRIS-TREE.—Now placed by Hooker and Bentham under Albizzia. A timber-tree of moderate size, not much seen in the vicinity of Calcutta, but a prominent object in most of the gardens of the Upper Provinces ; flowers large, tassel-like, pale-green, diffusing widely around an exquisite perfume, particularly at night. It seems to prefer an arid climate, for it was in such a locality that Firminger observed it thrive most vigorously. *Syn. Albizzia Lebbek*.

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A. *decurrents*.—Sir J. Paxton says it is "a magnificent plant with handsome foliage, occupying half a pannel of conservatory-wall at Chatsworth" ; introduced into the Gardens of the Agri-Horticultural Society by Mr. Fortune from China ; but its culture was attended with no success, and it does not exist there now.

A. Houstoni.—A large ornamental shrub, seven or eight feet high ; native of Mexico ; of recent introduction ; with handsome bipinnate foliage, the small narrow leaflets set like the teeth of a comb ; bears during the hot months large crimson flowers of bottle-brush form.

A. suma.—A deciduous tree affecting moist situations by the side of tanks and canals. Conspicuous by its white bark and the whitish down covering the young shoots and petioles. The above characters are most pronounced at the close of the hot season when the tree bursts into leaf and flower. Flowers spicate, dull white.

A. latranum.—A curious flat-crowned or table-shaped tree found on the lower pulneys, and hills of the Southern Carnatic. Spines often enormous, apparently hollow, and may be the homes of ants.

Among the Australian Acacias, found in South Indian hill stations, are *A. decurrens* (Black Wattle), *A. melanoxylon* and *A. dealbata* (Silver Wattle). The last named is found everywhere in Wellington and Ootacamund, either springing up spontaneously or placed as a hedge. It normally flowers about August, but may flower as early as April.

All Acacias are easily propagated by seed.

ALBIZZIA.

A genus of large deciduous trees with sweet-scented flowers. *A. stipulata*, in addition to being a handsome tree, is extensively used as a shade for tea plantations. *A. moluccana*, an introduced species, is similarly used in the south to shade coffee. *A. procera* is a graceful tree common in Deccan gardens.

CALLIANDRA.

C. longipes.—A small shrub, with delicate pinnate foliage ; of no great attractiveness ; flowers small, pink, Mimosa-like.

C. brevipes.—Native of Brazil ; described by Curtis as a "pretty branching shrub, four or five feet high ; requires pruning to make it a compact handsome bush ; when in flower highly ornamental, its bright red tufts contrasting with the delicate green foliage."

C. hæmatocephala.—Best known in Calcutta as *Inga hæmatoxylon* ; a shrub five or six feet high, handsome at all times for its graceful foliage of pinnate leaves, with wedge-formed smooth leaflets an inch long; but remarkably beautiful when in full blossom in the cold season, with its large bright crimson bottle-brush-like flowers; yields seed sparingly.

C. Portoricensis.—A small shrub in the Calcutta Botanical Gardens; native of the West Indies; with pretty, dark-green, graceful, pinnate foliage; bears in March white, moderate-sized, not very ornamental flowers of bottle-brush-like form.

PITHECOLOBIUM.

A genus of somewhat handsome-leaved plants of very rapid growth. Rather of straggling habit, and growing to a height of twenty feet or more if not kept down by constant pruning.

P. hæmatoxylon.—A shrub three to five feet high, with dark green foliage, and bearing brilliant scarlet tassell-like flowers during the hot and rainy season and at the end of the cold season.

P. dulce—MANILLA TAMARIND.—A large growing shrub, native of Mexico, with handsome dark green leaves. The flowers are insignificant. Well adapted for, and largely used as, a hedge-plant. Must be kept well cut in. Bears curious twisted seed-pods, which are considered very nourishing food for cattle and horses, and on that account a plant of much economic value.

P. saman—THE RAIN TREE.—A large tree of extraordinary rapid growth, native of Brazil. An excellent shade tree where there is a fair amount of subsoil water.

All of the foregoing are easily propagated by seed sown during the rains.

ANACARDIACEÆ.

SCHINUS.

S. molle.—A most graceful weeping tree of 15 to 25 feet. Originally introduced from South America, this species has travelled extensively in subtropical and warm temperate countries. It is, therefore, known as the Australian, and Californian Pepper-tree, as the Peruvian Mastic-tree, and as the Indian Weeping Willow. The latter designation is quite a misnomer, though, for all practical purposes, the tree is, in size and habit, something like a Willow. It grows well at Bangalore, and is much sought after for lawns, cemeteries, and parks. Propagated by layering and by seed. The tree will stand a very dry climate if it has a fair amount of soil water, but it dies if planted in heavy clay soil with little drainage.

PISTACIA.

P. chinensis.—A small tree seen in Botanical Gardens. Not of great merit.

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SAPINDACEÆ.

CARDIOSPERMUM.

C. Halicacabum—HEART-SEED—BALLOON-VINE—A creeping plant, a common weed of this country, produces insignificant flowers, but is sometimes cultivated for its graceful foliage and the numerous singular inflated seed-vessels it bears ; seed may be sown at any season.

PAULLINIA.

This is a very extensive genus of South American climbing shrubs, furnished with tendrils. A few species are cultivated for the beauty of their flowers which are white as a rule and borne in racemes. They thrive well in our conservatories and are easily propagated by seed and cuttings. A light, rich, soil suits them best. The species cultivated in gardens are :—*P. Hooibrenkii* and *P. thalictrifolia.* But a variety of the last named, *argentea,* is described as a splendid plant.

The chief interest of the genus, however, lies in the fact that *P. sorbilies* yields the famous guarana, which enters so largely into the dietary of the Amazonian Indians, and which is now also used in medicine by Europeans. The active principle of the plant is identical with the Theine of tea.

MELIANTHUS.

M. major—THE HONEY SHRUB.—This fine foliage plant, with its large pinnate, somewhat irregular, glaucous or frosted looking leaves, is not uncommon in the cooler parts of India. But it soon dies on the plains. It does well planted in a large rockery ; where there is some shade. Propagated from side-shoots. Though not ornamental, the flower is said to contain much honey. Running wild at Ootacamund.

KŒLREUTERIA.

K. paniculata.—A middle-sized tree, native of China ; very ornamental from its large, variously-divided foliage, and its conspicuous terminal compound spikes of rich yellow flowers.

This highly interesting monotypic genus would possibly succeed on the hills, where it should be tried.

DODONÆA.

BANDRIKE.

D. viscosa.—An exceedingly pleasing, evergreen, large, bushy shrub, with foliage strongly resembling that of the Arbutus. Flowers pale green and insignificant. It thrives well in the United Provinces, on the plains of Mysore, and throughout the Deccan, where its large expanse of cheerful green foliage is very refreshing to the eye.

Propagated by seed, which it bears abundantly. Extensively used for hedges. The seasoned wood makes good handles for garden tools. It tolerates a very dry atmosphere and direct brilliant sunlight. Its stature depends on the amount of water it receives at the roots.

AMPELIDEÆ.

VITIS, Syn. CISSUS.

V. discolor.—A very choice, slender, creeping plant, with foliage, when in a thriving condition, of exquisite beauty. Leaves lanceolate, about five inches long, mottled with red, white, and dark green, with the richest velvet-like lustre, borne upon delicate, pale-red stems. Produces in the cold season pale, minute, insignificant flowers. Requires a light, porous soil, through which water will drain away freely, and absolute exclusion from the sun. A humid atmosphere and a dark situation are most congenial to it. Propagated by cuttings in sand under a bell-glass. *V. albo-nitens* and *striata* are new species.

LEEA.

L. sanguinea.—A very large, herbaceous plant, with pinnate foliage of large, long, lanceolate leaflets ; of rather weedy character, but handsome during the rains for the mingled bright crimson red flowers and berries it bears in large flat cymes, of the size of a man's expanded hand, much like those of Clerodendron squamatum. *L. amabilis* and *coccinea* are ornamental species worth introducing.

AMPELOPSIS.

A. quinquefolia—VIRGINIAN CREEPER.—This Vine, so remarkable for the fine autumnal tints of its foliage, only succeeds in the colder parts of India. Grows slowly at Ootacamund.

A. tricuspidata.—Differs from the above in having three-pointed leaves. A climber with pretty foliage and tendrils, the latter adhering to supporting bodies by small sucker-like processes found at the extremities. It is grown in the grass conservatory in a light rich soil. On the hills, keep in a glass-house with moderate heat. Propagated by layers during the rains.

A. Veitchii is said to be a synonym of *A. tricuspidata*.

BHAMNEÆ.

RHAMNUS.

R. dahuricus—CHINESE BUCKTHORN.—An armed shrub with smooth leaves and small greenish flowers. Occasionally seed in hill gardens, but not of much horticultural value.

COLUBRINA.

C. asiatica.—An evergreen shrub of rather pleasant appearance in the shrubbery. Flowers greenish-yellow. Indigenous. Seeds freely.

ZIZYPHUS.

Z. nummularia.—A scandent prickly shrub found in hedgerows and around villages. When properly trimmed, it forms an excellent live fence for the protection of property. It possesses no other merit for garden use.

PHYLICA.

P. ericoides—CAPE HEATH.—This small shrub is rarely found in gardens at hill stations, where it thrives indifferently. Leaves small, leathery, linear-lanceolate. Flowers white, in roundish heads. Succeeds best in a peat soil. Propagated by cuttings on a hot-bed.

CELASTRINEÆ.

EUONYMUS.

E. garcinifolia.—A small shrub, remarkably bright and sparkling when in full blossom in May and December. Flowers small, numerous, of a brilliant blood-colour. This is the only species of any interest; all others bear pale-green, inconspicuous, unattractive flowers. Propagated by cuttings in the rains.

E. variegata.—A shrub about three feet high, introduced by Mr. Fortune from China. In a climate that suits it, its round, rigid, smooth, glossy, variegated leaves render it a very handsome object.

E. japonicus, with several variegated forms of the same, are not uncommon on the hills under cultivation.

CELASTRUS.

C. paniculata.—A scandent shrub of the low hills and scrub tracts in the south. Flowers pale yellow, of little importance. Useful medicinal properties are attributed to the seed and oil, both of which are marketable articles in the bazaar.

ILICINEÆ.

THE HOLY FAMILY.

Shrubs and trees. Represented in the Himalayas by several species of Ilex. Leaves coriaceous, simple often shining and spinescent. Flowers greenish and inconspicuous.

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I. Aquifolium—COMMON HOLLY.—This popular English tree cannot be grown on the plains of India. But at Darjeeling, Simla, and other horticultural centres in the north, it should grow. Some of the numerous variegated forms of this species are exceedingly beautiful.

I. cornuta—CHINESE HOLLY.—This grows at Bangalore, elevation 3,000 feet.

I. paraguariensis—PARAGUAY TEA TREE.—This ornamental evergreen tree which furnishes the Yerba de Maté of South America, is cultivated in Botanical Gardens in this country. It is usually seen in the form of a fine bush.

MELIACEÆ.

SWIETENIA.

S. Mahogani—MAHOGANY-TREE.—An immense timber-tree, with beautiful foliage of moderate-sized, ovate, rich green leave. Dwarf shrubby plants may be obtained by propagating from cuttings which have a very ornamental appearance in any spot where a mass of refreshing green foliage is required. The large full-grown trees sometimes met with about Calcutta produce seed, from which young plants may be raised. Seed is also obtained at Madras and Bangalore. The tree grows admirably in deep river soil near Poona. A good avenue tree.

MUNRONIA.

M. Javanica.—A small shrub, introduced by Mr. Grote. Produces in the rains deliciously-scented white-flowers.

TURRÆA.

T. obtusifolia.—A shrub of 6 to 9 feet, introduced from Natal. Very attractive and fragrant while in blossom. Flowers greenish-white changing to yellow, bearing some resemblance to honey-suckle. Propagated from seed and by cuttings.

MELIA.

M. azadirach—PERSIAN LILAC—*Bukáyun.*—A graceful tree with bipinnate leaves and small white and purple flowers. It grows rapidly but does not stand Deccan climate. It appears to do better in more humid parts of India.

AZADIRACHTA.

A. indica—THE NEEM TREE.—A near relative of the last named tree but differing from it in leaf, flower and constitution. The neem leaf is pinnate, the flower small and yellow, and the tree stands

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a very dry climate. It is a good roadside tree in dry districts, but a comparatively slow grower.

AGLAIA.

A. odorata.—An exceedingly handsome bushy shrub, native of China, three or four feet high, with neat ternate leaves of lanceolate, smooth, deep green, shining leaflets, two or three inches long. Blossoms at uncertain times in the hot and rainy seasons, with a prodigious number of bright yellow flowers, of the size and form of a pin's head, delightfully fragrant. Mr. Fortune says the flowers are much used by the Chinese for scenting their teas. Don states that the berries it bears are eatable when ripe ; but it is never known to bear any here. Propagated by cuttings.

This Order contains some other fine trees of which the following are mentioned :—

Melia dubia—Mountain Neem.
Soymida febrifuga—Swami Tree.
Chickrassia tabularis—The Chittagong-Wood Tree.
Chloroxylon Swietenia—The Satin-Wood Tree.

BURSERACEÆ.

A tropical family of balsamiferous trees and shrubs. The resinous products known as Sambrani, Elemi, Myrrh, Olibanum and the so-called Balm of Gilead are all obtained from different species of the Order.

FILICIUM.

F. decipiens.—A handsome evergreen tree of compact and globular form. Foliage dark green. Flowers whitish, but of no merit. This is an exceptionally good tree, either for grouping or small avenues, being intermediate in size. It is a native of Ceylon. Propagated by seed. Other ornamental trees of the family are *Garuga pinnata, Boswellia serrata,* and *Protium caudatum*. Also the Black Dammar Tree, *Canarium strictum*. Writing of this lofty tree of the Western Ghauts, Beddome remarks that "its brilliant crimson foliage makes it a most beautiful sight when in young leaf."

OCHNACEÆ.

OCHNA.

O. squarrosa.—The large bright yellow flowers of this small tree are produced in great abundance at the close of the warm season, and are very attractive for several weeks.

O. pumila.—A shrub having flowers of even larger size than the preceding species. Orange-yellow. Both are propagated from seed which is, however, somewhat rarely to be had.

SIMARUBEÆ.

QUASSIA.

Q. amara.—A tree in Surinam, its native locality, of considerable size; grows here to not more than about seven feet high, and is regarded as one of the choicest, as it certainly is one of the most beautiful, plants of our Indian gardens; leaves unequally pinnate; leaflets obovate, four inches long more or less; leafstalks with wide, crimson-tinged wings; bears in April and May terminal racemes of Erythrina-like bright crimson-scarlet flowers. Propagated by gootee, as well as by cuttings, under a hand-glass in sand.

AILANTHUS.

A. excelsa—TREE OF HEAVEN.—This is a tree of the country which is remarkable for its rapid growth when young. Deciduous for a short period in the hot season. Pinnate leaves 3 to 4 feet long, rough and hairy. Flowers pale yellow, on long axillary panicles. Very subject to the attack of caterpillars. Raised from seed.

A. braziliensis.—A large hill species said to be very attractive while in leaf.

RUTACEÆ.

ERYTHROCHITON.

E. braziliensis.—A small tree, described as having "foliage fragrant with the scent of Oranges, and bearing large white flowers with fine red calyces." Apparently unsuited to the climate, as the specimens in the Calcutta Botanical Gardens do not show that the climate of this country is congenial to them.

RAVENIA Syn. LEMONIA.

R. spectabilis.—A most charming shrub, native of Cuba, with ternate leaves of equal size, obovate, smooth, rich polished-green leaflets, about two inches long, contrasting handsomely with the cork-like bark of the stems, and which when bruised, have an agreeable fragrance like that of Fraxinella; nearly always in blossom with bright, crimson-pink, five-lobed flowers, of the size of a four-anna piece; requires shade and moisture to give the foliage the rich deep verdant green which renders this plant so beautiful. Produces seed abundantly in the cold season, which, before ripening, should be tied up in muslin, or is sure to fall and be lost. Propagated also by cuttings.

There is a variety with pale pink flowers, but not so handsome. *R. rosea*; also *R. humilis* with white flowers.

BORONIA—CROWEA—CORREA—CALODENDRON—DIOSMA —BOROSMA—AGATHOSMA.

The numerous species of these several genera, the three first natives of Australia and the remainder of South Africa, are for the most part very ornamental shrubs, producing beautiful flowers, and much cultivated in greenhouses in Europe, but not a single one is to be met with in this country, nor is it at all probably would be able to exist in the climate.

DICTAMUS.

D. Fraxinella.—This old familiar, fragrant-leaved plant of the English gardens is altogether unknown here.

LUVUNGA.

L. scandens.—A climbing shrub, native of Sylhet, with lanceolate pointed leaves, six inches long; described as being corymbs of middle-sized, delightfully fragrant white flowers. Propagated by layers during the rains.

CITRUS.

A genus of fruit-trees described elsewhere; all, without exception, most delightful ornament to the garden, alike for their foliage, their flowers, and their fruits.

RUTA.

R. angustifolia—RUE.—The prettily-formed hoary-green foliage of this small well-known herb forms a pleasing variety amongst other pot-plants; bears in the cold season greenish-yellow uninteresting flowers. Propagated by division. There is a belief that the strong smell of this plant will keep off snakes.

R. graveolens.—The Common Rue of the English gardens, between which and the last the difference is not very perceptible.

MURRAYA.

M. Kœingii and *M. exotica* are graceful small-leaved shrubs, admirable for bordering narrow walks in protected parts of subtropical gardens.

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GERANIACEÆ.

PELARGONIUM.

GERANIUM.

This favourite plant, known to all under the common name of Geranium, and comprising some hundreds of varieties, is a native of South Africa; but is almost naturalized in this country; while in England and on the Continent it has been brought to such perfection by crossbreeding as to be now classed as a Florist's Flower.

It was not so very long ago that the Pelargonium was represented out here by a few common-place scarlet varieties only; during the last ten or fifteen years, however, hundreds of varieties have been imported from Europe, and have been found to succeed very well with a little careful management. On the hill stations Pelargoniums thrive and bloom to such perfection that lovers of this flowers on the plains now make it a point of obtaining their supplies of plants thence every year to replenish their exhausted stock, instead of importing them from Europe. This is certainly the best plan, as amateurs and others on the hills import all the newest and best varieties from Europe, and are able to raise a large stock of plants in one year; for Pelargoniums make most vigorous growth on the hills, and are so easily propagated by cuttings put down at any time during the year.

The best plan for those on the plains is to obtain a large number of cuttings in the month of October from the hills. On receipt, put them down at once in sand with some bottom heat. They will strike in two or three weeks, when they should be potted off singly into two-inch pots, shifting them into larger ones as they progress. They should get their final shift into six-inch pots about the end of December, the soil chosen being light and rich. They should be liberally watered with occasional—say weekly—applications of liquid manure. The leaves should be frequently washed or syringed with soap-suds, by which they are much benefited. They will then bloom to perfection from about the middle of January to the end of March, or later in Upper India.

It is difficult to keep the plants alive through the hot and rainy seasons, especially the latter. During the hot months they require to be entirely sheltered from the fierce rays of the sun; but in a grass conservatory they do very well. In the rainy season, they must be absolutely protected from the wet, if in pots, while getting as much light as possible; otherwise they will rot and die off.

Propagation by cuttings is the easiest and safest method of increasing the stock of plants; but they can also be raised from seed which should be sown in October. In the latter case the plants will not bloom till the following cold season, if they can be made to live till then. About the middle of October the plants saved should be

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well cut back and re-potted in fresh soil ; the branches cut off being utilized for cuttings.

On the hills the pruning and re-potting should be done about the middle of February or, if the season is a late one, about the beginning of March. When they are done flowering, i.e. about the third week in November, the pots should be plunged in the soil under protection of glazed frames, or in a greenhouse, where they should remain until the time comes round for re-potting and pruning. They require very little water during the winter months—only just sufficient to keep them alive.

In Poona and places with similar climate propagation is best done in the rains but may be carried out at any time. The plants do well outside in the ground in such climates.

There are several classes of Pelargoniums, *viz.*, (1) the ordinary scarlet flowered ; (2) the Zonal, or horse-shoe, known also as Bronze, Silver, and Gold leaf tri-colours ; of these there are hundreds of varieties both single and double flowered. Then there are (3) the Ivy-leaved varieties, which are mostly climbers ; (4) the Lemon and Rose-scented, remarkable for the delicious fragrance of their leaves ; and lastly the Fancy, or large-flowered, also known as "Oak-leaved". These last named do not succeed well on the plains and might be left out as a rule ; although they are by far the most beautiful of the flowering varieties. It would be tedious to give a list of the names. A catalogue from an English nursery will supply this information, from which a selection could be made. This will, however, be found unnecessary if cuttings or plants are obtained from the hills. The selection might with advantage be left to the person from whom they are obtained ; or he might be asked to supply a list of the named varieties in his possession, and by comparing these with the descriptive lists given in the English nursery-men's catalogues, a very good selection can be made.

OXALIS.

A genus of very beautiful small bulbous plants, affording during the cold months, while they are in blossom, a most delightful decoration to any verandah somewhat exposed to the sun. They begin to die down at the beginning of May, and should then be no longer watered. When dry the bulbs may be either removed from the earth, and stored away in a bottle of sand, or be put aside just as they are, undisturbed, in their pots in some place out of the wet till October, when they begin to start again. But a little before that time they must be carefully watched, in order to pot them immediately and expose them to the light when they show signs of starting, or they will, in a very short time, exhaust themselves by throwing out long white shoots and then perish.

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Mackintosh says :—

"They should be taken out of the mould every season for the purpose of being separated ; for if the smaller roots be not removed from the full-grown ones, the latter will not flower freely. They delight in a light rich soil."*

The soil, however, may easily be rendered too rich, and then, as Firminger found, the leaves become yellow and sickly. A compost of leaf-mould, common mould, and a little silver-sand, he believed, suits them best.

The undermentioned are those usually met with in the Calcutta gardens ; bulbs of these and other species, if not procurable here, may easily be sent for to any of the seedsmen in England.

O. Bowiei.—A rather common species, and a remarkably beautiful one, most so perhaps of any, with large handsome leaves, the agreeable fresh greenness of which affords a fine set-off to the large deep rose-coloured flowers of the size of a rupee, that are borne numerously in heads upon footstalks six inches high throughout the cold season.

O. rosacea.—Somewhat similar to the last, the flowers being deeper in colour with large yellow centre, borne upon short footstalks close to the ground among the leaves. A perfect little gem when thriving and in full blossom.

O versicolor.—Bears crimson flowers ; very inferior to either of the two preceding.

O. variabilis.—Bears small dull-crimson flowers.

O. Deppei.—Bears small pale pink flowers ; a common uninteresting plant ; grows like a weed nearly everywhere.

O. tetraphylla.—A common and very pretty plant ; unlike the rest of the species it has leaves with four lobes instead of three, and bears its purplish-pink flowers during the hot and rainy seasons, and not in the cold months.

O. lanata.—A pretty plant, with leaves of a peculiar pale bluish-green colour : flowers white, not showy, nor opening very freely.

O. bipunctata.—A pretty unpretending plant, with small leaves and umbels of small white flowers upon long footstalks.

O. cuprea.—A charming plant with glaucous green leaves ; bears in profusion upon long footstalks, umbels of flowers like golden-yellow primroses.

O. cernua.—Has its leaves curiously speckled with black spots ; presents a very brilliant appearance when bearing its profusion of bright-yellow flowers, somewhat smaller than those of the last.

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*"Greenhouse," p. 128.

O. rosea.—A very pretty little unpretending annual; bears numerous small rose-coloured flowers, but very effective when grown in masses. Grown besides this the new species *O. valdiviensis* and *Tropæoloides*, form a very pleasing contrast, with their numerous cheerful yellow flowers. *O. corniculata* is a pretty plant with compact purple-brown foliage and yellow flowers. These three last, though perennial, may be grown as annuals. Sow the seed in October on the plains, and in March on the hills.

TROPÆOLUM.

T. majus—NASTURTIUM—INDIAN CRESS.—A more beautiful and showy annual than the Nasturtium is not to be met with. In Lower Bengal, scarcely any more care is required in its cultivation than having first enriched the soil with a little old manure, to drop a few seeds in the places where the plants are intended to remain, and to keep the earth moist by daily watering. The seed may be sown in the middle of October, and the plants will be in full bloom by the middle of December, and continue so till the hot weather sets in. But in the north of India the plants must be covered over at night, or they will be sure to be destroyed by the frost. Nor will it answer to delay the sowing till the frosty nights are over, as in that case the plants will perish by the heat before coming into bloom. On the hills they may be sown in succession from March to May. In Poona and places with similar climate the plant does well if sown at the break of the rains.

The number of varieties is very great, producing flowers of a pale straw colour, orange, scarlet, dark rich crimson brown, and of every intermediate hue, spotted and striped. The dwarf varieties called Tom Thumb, grow compact little plants, without the tendency to send out runners, as is so much the habit of the larger kinds. They yield seed in abundance, which, when gathered, should be thoroughly dried and kept till sowing-time in well-closed bottles.

T. peregrinum—CANARY CREEPER.—A pretty slender creeper, bearing small canary-coloured flowers, growing in course of time to a considerable height, and requiring a trellis for its support. It cannot endure heat; and the seeds must not be sown till the cold weather is well set in, or the young plants will be sure to die off. Sow in March on the hills. Residents on the hills should introduce and grow the perennial species, many of which are very beautiful.

LIMNANTHES.

L. Douglasi.—A low trailing plant, producing poor, miserable flowers, not equal to those of a common Buttercup, which they somewhat resemble. Sow the seeds where the plants are to remain, in a moist, shady situation, in October on the plains, and in March on the hills.

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IMPATIENS.

I. Balsamina—BALSAMS—*Gool Mehndee.*—Native of India. In a garden where the plants have once been grown, seedlings will be sure to come up self-sown each succeeding season ; but these will be weedy, worthless plants, and should be pulled up and thrown away. The finer kinds, raised from imported seed, produce immense double flowers, resembling full-grown Camellias, of various colours—White, rose, scarlet, purple, and variegated—and are about the most lovely of all annuals.

"A very great mistake, I believe," says Firminger, "is usually made in regard to the time of sowing the seed. Sometimes it is sown in July in Bengal, and the consequence is that many of the young plants perish from the wet, while those that manage to survive come into blossom only to have their flowers destroyed or damaged by the heavy rains. Again, the seed is often sown in October, with that of the other annuals ; but the Balsam requires more warmth than it meets with at that season to make much growth. I have found that by sowing the seed in Calcutta, about the beginning of September in pots, large, well-grown plants may be obtained by the close of the rains. If at that time the plants thus raised be put out in the border in well-enriched soil, they will blossom in perfection and preserve their beauty unimpaired for a very long time. In Upper India, however, the best time to sow the seed is in June about the commencement of the rains. Balsams, moreover, put out in the border during the rains, I have often noticed perishing from no apparent reason ; but, on pulling them up, and splitting the stalk with my thumb-nail, I have invariably found in them a great maggot that had devoured the substance of the interior. I know no preventive against this." In Poona and places with similar climate, sow at the break of the rains.

In planting out the Balsam, the stem should be sunk up to the leaves. Of if it be grown in a pot, the pot should be several times changed a very small one taken first, and a larger one each time, and each time the stem should be buried up to the leaves in the soil. Balsams love a light rich soil and plenty of water.

On the hills, the best time for sowing is about the end of March in pots under glass. The plants should not, however, be put out in the beds and borders before the end of April. In all other respects the treatment for the plains will suit on the hills. The wild varieties found on the hills have a most beautiful effect when in full bloom in July and August. Great patches of them cover the hill side, in all shades of colour from white. pink. scarlet and yellow. The flowers however, are single and insignificant in size.

In the Journal of the Agri-Horticultural Society, Vol. II, 2nd series, will be found a paper by Mr. J. Scott, giving a description of several species of Balsam. of this country, of some of which he speaks highly.

I. Platypetalum.—This herb is best suited for the hills. Flower rose-coloured.

I Jerdonæ.—Also on the hills. Flower, green, yellow and red; large and distinctly pretty. Syn. *I. parasitica.*

I. Hookeriana.—Succeeds well from 2,000 feet upwards. A large herb 2—3 feet. Flower large, white, streaked or barred with red.

I. Phœnicea.—A smooth succulent herb 5,000—8,000 feet. Flower brilliant scarlet with yellow centre. Dry this herb to place in cupboards.

I. Hawkeri.—This is a free-flowering imported herb; succeeds on the plains. Flower large, magenta-reddish.

I. Sultani.—Like the last-named, but with pale-green leaves and bright magenta-red flowers.

This is a very large Indian genus, the Flora of British India, describing no less than 12ß species. But most of the latter are confined to the hill forests.

HYDROCERA.

"*H. triflora*—Domootee.—an aquatic, with lanceolate leaves, four to five inches long and one broad. Flowers large, white, variegated with red and yellow. It well deserves a place in the garden. Cultivate in *gumlahs* half-filled with ordinary garden-soil; watered till it becomes mud. Sow seed in February, or beginning of March; add water as the plants grow—two or three inches above the surface of the soil quite sufficient to keep the plant in vigorous health. It flowers continuously to the commencement of the cold season, when it begins to die down. If the *gumlah* be undisturbed, self-sown seedlings appear abundantly next year."—*Scott.*

ZYGOPHYLLEÆ.

TRIBULUS.

T. lanuginosus.—A low trailing plant with pinnate leaves; bears nearly always large, bright-yellow sweet-scented flowers.

T. cistoides.—A trailing herbaceous plant with pleasing dark-green foliage of pinnate leaves; bears throughout the year large pale-yellow flowers, much like widely-expanded Buttercups. Propagated by layers and cuttings.

GUAIACUM.

G. officinale—THE LIGNUM VITÆ TREE.—This small ever-green tree has been introduced from the West Indies, where it flourishes near the sea. It succeeds well at Madras and Bangalore, though at

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the latter station it is rare, and rather stunted in growth. The pretty blue, cup-like flowers are produced in clusters at the ends of the branches, where they remain for a long time. A good tree for the lawn. Raised from seed.

MALPIGHIACEÆ.

MALPIGHIA.

BARBADOES CHERRY.

A genus of very ornamental small shrubs; propagated easily by cuttings. The undermentioned are common in Indian gardens:—

M. glabra.—A small shrub with very agreeable foliage of oval, pointed, smooth, shining deep-green leaves, three inches long; bears, in May and November, from the axils of its leaves, numerous little umbels of small, pretty pale-purple flowers, with a knob of yellow anthers in the centre.

M. urens.—A small shrub with dark-green myrtle-like leaves, contrasting beautifully with its small, pure-white flowers.

M. coccifera.—A very charming, small shrub, with densely-crowded diminutive holly-like leaves; presents a delightful appearance when covered with its bright sparkling-white buds, just about to open. Flowers, when expanded, pale-pink, succeeded by cherry-like berries of the size of a Pea.

STIGMAPHYLLON.

S. periplocifolium.—A handsome scandent plant, native of tropical America, producing fine yellow flowers. Propagated by layers.

S. aristatum.—This is one of the most elegant, clean-looking and pleasing of all small creepers. Leaves glossy. Flowers yellow, beautifully fringed. Suitable for a small trellis or archway near the house. Propagated by layering.

BANISTERIA.

B. laurifolia.—An extensively climbing shrub, with lanceolate dark olive-green rigid leaves, eminently ornamental when in blossom from January to April, and densely covered with large compact trusses of bright golden-yellow flowers. Propagated by layers.

B. argentea.—Has leaves larger than those of the preceding; very ornamental for the silvery hue of their under surface.

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GALPHIMIA.

A genus of dwarf American shrubs. An anagram of *Malpighia.* There are several species bearing yellow and reddish flowers. Not very ornamental. *G. nitida, glauca,* and *glandulosa* are found in Indian gardens. Propagated by cuttings of the matured wood during the rainy season.

TRISTELLATEIA.

T. australasica.—A glabrous woody climber introduced from the Eastern Archipelago. Flowers bright yellow, in terminal and axillary recemes. A nice clean-looking plant which flowers during the rains. Propagated by layers and seeds.

HIPTAGE.

H. Madablota.—A very large rampant shrub of scandent habit, with lanceolate pointed leaves, seven inches long ; handsome when in full blossom with its profuse trusses of white and yellow fragrant flowers, somewhat resembling those of the Horse-chestnut, in the month of February.

CAMAREA.

C. lucida.—A small tree, of coarse woody character ; constantly in blosom with numberless beautiful compact clusters of small flowers ; those in the upper part of a bright pale-red, and those in the lower part pure white. None of the foregoing are suited for the hills.

LINEÆ.

LINUM.

L. grandiflorum, var. kermesinum—SCARLET FLAX.—A delightful annual ; bears in great profusion largish, expanded, bright crimson flowers ; thrives and blossoms in great beauty in India, and yields seed abundantly, which may be saved from year to year ; sow in October. The young plants require to be transplanted cautiously, or are likely to suffer. Firminger never found them answer in pots so well as in manured soil in the border. *L. usitatissimum* is the common blue-flowered flax.

REINWARDTIA.

R. trigyna—Busuntee—Gool-ushrufee.—A glabrous under-shrub of 2—3 feet. Common in most gardens where, when in blossom in the cold season, it is a most showy ornament, with its unbounded profusion of large, orange-yellow, rock-rose-like flowers. Propagated by division of the roots in October.

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R. tetragyna.—A plant of the same size as the last, with much larger leaves; equally showy with its large pale, sulphur-coloured flowers; but not so common.

TILIACEÆ.

ARISTOTELIA.

A. Macqui variegata.—A pretty variegated shrub of 5—6 feet. Suitable for cultivation on the hills. Raised from cuttings under a handglass.

SPARMANNIA.

S. africana—AFRICAN HEMP.—A large shrub imported from Natal. Leaves cordate-acuminate, softly pubescent. Flowers pretty, in terminal clusters, petals white, filaments yellow, anthers purple. This should prove hardy in sub-tropical India. *S. palmata* is a more recent introduction from the same place. Both are raised from cuttings.

GREWIA.

G. natalensis.—A scandent South African shrub with pretty purple-coloured flowers. Propagated from seed and cuttings. Most of the indigenous Grewias require a lot of space in the garden, are untidy in habit and scarcely compensate the grower for his trouble.

BERRYA.

B. Ammonilla—TRINCOMALLEE WOOD.—This ornamental tree forms a distinct object in the compound, with its large panicles of pink flowers succeeded by clusters of curiously winged fruit. Propagated from seed.

The genus *Elæocarpus* furnishes some highly ornamental trees, suitable for the lawn, arboretum or avenue.

STERCULIACEÆ.

HELICTERES.

H. Isora—SCREW-TREE.—A small tree or shrub of no great beauty, either for its foliage or the small pale red flowers it bears, but interesting for the curious screw-like form in which the seed-pods twist round each other. Propagated by seed in the rains.

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STERCULIA.

S. coccinea.—A small tree, with rich, showy foliage of lanceolate leaves, very ornamental when, about the end of May, the large velvety deep crimson-scarlet seed-vessels split open, and disclose the small, purple prune-like seeds attached to them. There are many handsome trees of this genus. Propagated by seed in the rains.

Neither of the above are suited for the hills, except in the south.

Several of the Sterculias are indigenous to India and become trees of considerable size. None are specially suitable for garden decoration.

ABROMA.

A. augusta.—A shrub of considerable size, with large, roundish, cordate leaves, of a dark sombre green; bears in the rains large, pendulous, eardrop-like, dull, blood-coloured flowers, succeeded by large, curious five-winged capsules. A character of gloom pervades the whole plant, contrasting pleasingly with the many other of the gay things of the garden, though perhaps hardly ornamental enough to entitle it to the large space it takes up. Propagated by seed. Not suited for the hills.

DELABECHIA.

D. rupestris.—This is the Bottle-tree of North-Eastern Australia and is the only representative of the genus. Its sole recommendation, for a place in the garden collection, is the singular shape of the trunk, which is bulged out in the middle like a barrel. The tree is of moderate size, with lance-shaped leaves, and bears short panicles of insignificant flowers. The trunk abounds in a mucilaginous substance, which is said to resemble gum tragacanth. Propagated by seed which it bears abundantly.

PENTAPETES.

P. Phœnicea—DOOPAHARYA.—The only representative of the genus. A native of India and a common weed of the rice-fields, but well deserving a place in the garden. It has an erect stem about two feet high, bearing a spike of middle-sized beautiful flowers, unrivalled for their deep carmine colour. There is also a white variety. Sow the seeds in July. The plant blossoms in September and October. Seed may also be sown in March in Upper India, and plants will bloom throughout the hot season. It will not thrive on the hills, except under glass. Sow in April.

DOMBEYA.

A genus of very large plum-formed shrubs, mostly natives of Bourbon; they take up a great deal of room, are coarse-looking, and only ornamental when in blossom, being then one entire mass of colour, from their numberless corymbs of middle-sized flowers, each by itself not very pretty. Propagated only by layering.

D. palmata.—Has seven-lobed, palmate, smooth, glossy-green leaves; bears in November greenish-white scentless flowers.

D. cuspidata.—Has rough three-lobed leaves, longer than broad; bears in September pinkish scentless flowers.

D. acutangula.—Leaves three-lobed, larger than those of the last, as broad as long; bears in December and January hydrangea-like corymbs of largish, round-petalled, pink-blush flowers, with a faint hawthorn-blossom-like scent.

D. viburnifolia.—Leaves similar in form to those of the last, but larger, covered with soft hairs; bears in January densely-crowded corymbs of white narrow-petalled flowers, with an agreeable hawthorn-blossom fragrance.

D. tiliæfolia.—Leaves heart-shaped and pointed; bears in the cold season sweet-scented rose-coloured flowers; a smaller shrub and less easy of propagation than any of the preceding.

D. natalensis.—A new species from S. Africa with pure white flowers like little cups. Propagated by cuttings and seed.

D. Mastersii.—An African plant, grows well at Poona; reaches height of 6 feet and is a thick spreading bush, with sickly-smelling flowers clustered under the leaves.

HERITIERA.

H. littoralis.—A small evergreen tree of very distinct and ornamental appearance. The large, crowded, oblong leaves are silvery underneath, so that shadows strike very clearly upon them, hence called the "Looking-glass Tree." Flowers unimportant. But the dense clusters of brown-beaked fruit, each the size of a large Walnut, are interesting. *H. Fomes* is a smaller species.

KLEINHOVIA.

K. Hospita.—This small evergreen tree, with its large, leaves and fine panicles of rosy-pink flowers, is rare in gardens. It is very showy and deserves more attention. Propagated by layers, seeds being rarely procurable.

MELOCHIA.

M. velutina.—During the months of November and December, nothing can be more effective in the distance than the silvery pubescence which clothes the young shoots and leaves of this small tree. Valuable on that account for scenic effect.

ASTRAPÆA.

A. Wallichii.—Native of Madagascar; a tree of from twenty to thirty feet in height, but plants will blossom when only two or three feet high; has very large, roundish, heart-shaped, rough coarse leaves; bears in February, on long pendulous footstalks, large compact bundles of small deeply rose-coloured flowers with yellow anthers. The flowers hang with their faces downwards, and, on small plants, can only be seen by being lifted up for inspection. Both Don and Sir J. Paxton say of it, that it is "one of the finest plants ever introduced into Britain, and that, when in flower, nothing can exceed it in beauty." It is not everyone, perhaps, who will concur in this opinion. It requires a good soil and shady situation. Mr. Ellis says, "in its native home it always luxuriates on the banks of a stream, or grows near water."* Propagated by layers, which take a very long time to root. Not suited for the hills.

PTEROSPERMUM.

P. lanceæfolium.—A large tree, native of Assam, with lance-head-like leaves of a tawny russet colour, with the under surface read-white; bears in the hot season large white fragrant flowers; a small tree in the garden, is a very ornamental object, for the striking peculiarity of its dense handsome foliage. Propagated by cuttings in the rains. Not suited for the hills.

MALVACEÆ.

ALTHÆA.

A. rosea—HOLLYHOCK.—This tall and handsome plant should be grown in all gardens. On the hills sow in the spring about March. In places with a climate like Poona sow at the break of the rains in June and again at the end of the rains in October. In most other places sow in October. The seedlings are transplanted once to their permanent quarters. Seed sowed locally is likely to give very mixed plants in the next generation as bees visit flower after flower and cross-fertilisation between varieties is certain. The bed for these plants should be heavily manured. They are not particularly striking massed in long beds, but as occasional groups, or a scattered line, they look well. Single and double varieties are available. Unsuitable for inside decoration.

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* "Madagascar".

PAVONIA.

A small genus of indigenous or Peruvian herbs and shrubs. Like most malvaceous plants they thrive well in this country, and require but little care in cultivation. The species in gardens are *P. odorata* (South Indian), an erect herbaceous, sticky plant with pink flowers which are sweetly scented, and *P. multiflora (syn. Wistii)*, a robust shrub with purplish-red flowers. Propagated from seed, and by cuttings in heat.

LAVATERA.

L. arborea—TREE MALLOW.—A miniature tree of 8—12 feet Leaves large, rubescent, on long stalks and 5—9 lobed. Flowers large pale purple. A showy biennial plant succeeding in the cooler parts of India. There is also a variegated form which is rare in cultivation. The latter is raised from layers and cuttings.

URENA.

U. lobata.—A small shrub, with roundish leaves, of so harsh and coarse a character, as all but to outweigh the beauty of the little rose-coloured flowers it bears in the hot season. Propagated by cuttings in the rains.

HIBISCUS.

The gardens of India are very rich in the number of handsome species of this genus that they contain. Most of them are very easily propagated by cuttings or by seed and do not require any particular treatment, although any little care bestowed upon them is amply rewarded by a richer display of blossoms.

In Hawaii an extraordinary number of handsome hybrids have been developed. It is well worth while getting a supply of seed from that place.

The Hibisci are distinctly garden plants and their flowers soon droop if cut for inside decoration.

H. mutabilis—CHANGEABLE ROSE—*Gool-i-ujaib.*—A very common large bushy shrub, eight feet high, with large heart-shaped downy leaves; bears in October and November, in constant succession, a profusion of large very handsome double flowers, somewhat like immense double Roses; white on first opening, then becoming cream-coloured, and finally of a deep rose tint. A most showy plant during the time it is in blossom; propagated by cuttings. The single-flowered kind, raised usually from seed, is not deserving a place in the garden.

H. tortuosus —*Bâlâ.*—A middling-sized tree: bears in February large bright, primrose-coloured flowers, with a rich puce-coloured

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centre, changing after they have been some time open entirely to crimson; very beautiful when in full blossom and covered with flowers, some so different in colour from others as to seem hardly to belong to the same plant.

H. collinus.—A small tree, with spreading branches and three-lobed, heart-shaped, smooth leaves; bears towards the end of the year large, full-expanding, pale rose-coloured flowers, with dark puce-coloured eye; most ornamental when in blossom, the flowers, relieved against the rich green foliage, presenting quite a dazzling appearance.

H. heterophyllus.—A small tree with long narrow leaves; very ornamental when grown of a small size; bears during the hot season largish flowers of the palest primrose-colour, almost pure white, with the edges prettily pencilled with pink, and with a dark-coloured eye.

H. Syriacus—Gurhul.—A bushy shrub four or five feet high, very common in gardens in all parts of India; leaves towards the base wedge-shaped, towards the apex three-lobed; bears during the hot and rainy seasons large lilac-blue flowers with dark purple eye. In the cold season the wood of the past year should be well cut in

a. A variety with double flowers of the same colour.

B. A variety also with double white flowers; but this, from some unassignable cause, is rarely seen to blossom in a thriving condition.

y. A variety likewise, the handsomest far of any, with leaves somewhat larger, and double pure-white flowers with fine dark crimson eye.

H. rosa sinensis.—CHINESE SHOE-FLOWER—*Juwa, Jasund.*—A wider spreading and more diffuse-growing shrub than the last, with much more agreeable character of foliage; leaves ovate, ending in a prolonged point, saw-edged, but not lobed; in almost constant blossom with its brilliant crimson-scarlet flowers, with the long pretty column of pistil and stamens projecting from their centre. Never known to produce seed here.

a. A magnificent variety, with flowers full four times the usual size, Firminger saw in blossom at Bangalore; lately introduced, he was told, from Kew.

B. A variety is common with double flowers.

y. A variety also is met with having pale, straw-coloured double flowers.

d. A variety also with double salmon-coloured flowers with crimson centre.

H. R. S. Cooperii, with foliage variegated.

H. Africanus syn. *Trionum.*—An annual of trailing growth; bears beautiful cream-coloured flowers with deep-puce-coloured eye;

likes a light sandy soil ; sow in October on the plains and in March on the hills ; the plants come early into blossom and produce seed abundantly, which should be saved from year to year.

H. calisureus.—A plant of more erect growth, and with flowers somewhat larger than those of the preceding, otherwise very similar.

H. Lindleyi.—A large shrub-like plant, bears during the rainy season, in constant succession, a profusion of large, rich crimson, very showy blossoms ; sow the seed in July on the plains and any time on the hills. An annual.

H. giganteus.—A very large plant, producing during the rains great, showy, primrose-coloured flowers of the size of a cheese-plate, with puce-coloured centre. Sow in June both on the plains and on the hills. Annual.

H. coccineus.—A large straggling shrub with long-stocked 5-pointed leaves of narrow segments. Flower large bright scarlet, very showy. A perennial plant. Easily raised from cuttings.

H. liliiflorus.—A shrub of the same size as the two preceding, but of more tree-like growth ; leaves somewhat leathery, oval, with their edges quite entire ; bears flowers similar in form to the single ones of the last, but of a beautiful salmon colour. There are one or two varieties of this charming plant differing in the colour of the flowers. It bears no seed, and is rather difficult of propagation, as cuttings do not strike readily ; it can only be increased by layering.

H. surattensis.—An intensely prickly trailer having large yellow flowers with a dark centre. Raised from seed.

H. Apelmoschus.—An annual erect herb of 3—4 feet. Leaves coarsely hairy, palmately lobed. Flower large yellow with crimson centre. Capsule large, cone-shaped ; seeds musky-fragrant. Much prized by the Hindus. Self-sown.

H. ficulneus.—Something like the preceding species. Flower much smaller, white, with rosy centre. Seeds not fragrant. Self-sown. Wild in Gujarat.

H. tricuspis.—A good-sized evergreen tree, introduced from the Society Isles. Flower large, gaping, yellow, with reddish purple base. Raised from cuttings.

H. Jerroldianus.—A small, very choice, herbaceous plant ; bears in the hot season very large splendid flowers of a fine carmine-crimson. The stem dies down in October, and the root lies dormant till the approach of the warm weather.

The following varieties have recently been added to an already large list :—

H. albo-variegatus ; *grandiflora variegata* ; and *zebrina* have variegated foliage.

H. schizopetalus and *H. schizopetalus grandiflorus* are scandent and semi-climbers in growth, with curious flowers of light scarlet, having the edges of the petals deeply cut and fringed, and turned over backward, like a Fuchsia, with the style projecting out. The flowers are borne drooping and have a fine effect.

H. brilliantissimus ; *carminatus-perfectus* ; *Colleri* ; *Cocksii* ; *cruentus*, *Dennisoni* ; *fulgidus* ; *Hawkeri* ; *kermisinus* ; *Lindeni*; *metallica* ; *puniceus* ; *Patonii* ; *splendens*, *Cameronii* and *vivicans* may be seen growing in most gardens about Calcutta.

On the hills, to grow any of the above satisfactorily, a glazed structure is indispensable.

GOSSYPIUM.

G. arboreum—TREE COTTON.—This ornamental species is cultivated in gardens for its dark-crimson foliage and flowers. It affords cotton for the sacred thread, and is, therefore, held in veneration by the Hindus. Propagated from seed.

MALVAVISCUS.

M. arboreus.—A large, ill-looking, woody shrub, of tree-like growth, with rather small, heart-shaped, three-lobed, coarse leaves, only to be commended for the numerous brilliant, small, crimson-scarlet, half closed flowers it constantly bears. Should be unspairingly pruned in the cold season. Yields seed abundantly, in small berries, ripening first pure white and afterwards deep scarlet.

PARITIUM (Hibiscus)

P. tiliaceum.—A small tree with heart-shaped leaves ; bears nearly always large, Hibiscus-like, sulphur-coloured flowers, with dark-puce eye. Requires severe pruning. Propagated by cuttings and seed.

P. elatum.—Somewhat similar but having large orange-crimson flowers. From the W. Indies where it affords the material called Cuba bast.

ABUTILON.

A. Bedfordianum—*Jhoomka.*—A tall growing herbaceous shrub, with rich foliage of luxuriantly-green palmate leaves ; bears in the cold season very large, pendulous, eardrop-like flowers, with folded petals of a pale orange colour, prettily pencilled with brown lines. A very choice plant, and one of great beauty when in full blossom ; very tender ; shelter from the violence of both sun and rain, is indispensable for it. It should be renewed annually, which may be done either from seed or by cuttings.

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A. striatum.—A smaller but more woody kind of plant than the last, and one that will better bear exposure ; bears similar flowers, but of about one-third of the size. To secure good plants, it is necessary to renew it annually from cuttings.

A. marmoratum.—Native of Mexico ; a small shrub, of recent introduction into India, about four feet high, produces beautiful erect flowers of the size and form of the Canterbury-Bell ; rose colour, marbled with pure white veins. It produces abundance of seed, plants raised from which come into blossom, in a very short time.

A. marmoratum Sellovianum.—An improved variety of the last-named.

A. Thompsoni.—Remarkable for its handsome foliage, which is a vivid green blotched with creamy white and yellow. Flowers very similar to the last.

The Catalogues of English Nurserymen contain names of over seventy varieties, nearly all raised by hybridization. Some of the indigenous species such as *polyandrum* and *muticum* are well worth a place in the shrubbery.

On the hills they must be grown under glazed shelter.

MALOPE.

M. trifida, var. grandiflora.—An erect-growing, tolerably showy annual ; bears large reddish-purple Mallow-like flowers ; sow the seeds in October on the plains and at any time on the hills, in spot where the plants are to remain, as they suffer severely from transplanting. In the neighbourhood of Calcutta, Firminger often found this plant thrive well till just when alout to blossom on the approach of the hot weather, and then die off without opening a single flowers. There is a variety with white flowers.

CALLIRHŒ.

C. digitata.—A most delightful annual ; thrives well in gardens at various elevations, and bears, in great profusion, moderate-sized bright pink flowers ; sow the seed (which may be saved from year to year) in October on the plains and at any time on the hills, and put the plants where wanted, either in rows or in patches.

THESPESIA.

T. populnea—THE PORTIA TREE.—Although naturally clinging to the sea-shores of India and Ceylon, this attractive evergreen tree is also abundantly planted all over the Deccan and Carnatic and grows well also in Gujerat. It is seen to perfection at Madras, where its fine foliage and yellow Tulip-like flowers attract notice at all seasons of the year. There it is one of the best avenue trees lining the streets and public roads. Should be raised from seed as the trees are then more shapely.

LAGUNARIA.

L. Patersonii.—This is a small tree of conical growth and glaucous foliage introduced from East Australia. Flowers pale-yellow and of little consequence. A shapely small tree for a lawn. Raised from seed.

Other ornamental trees of this family are : *Bombax malabaricum*, a silk-cotton tree bearing a magnificent display of large crimson flowers, in advance of the leaves, in the hot season : *Eriodendron anfractnosum*, the white-flowered silk-cotton tree, and *Kydia calycina*, also with white flowers.

DIPTEROCARPÆ.

An order of large resinous trees few of which find a place in Indian horticulture. But exceptional to this is the lac-insect tree, *Shorea talura*, which, in the month of March, scents the whole garden with an abundant display of creamy-white flowers. The later precede the young leaves, and are, therefore, very conspicuous. The Sal tree, *Shorea robusta*, has pale yellow flowers.

TERNSTRŒMIACEÆ

CAMELLIA.

C. Japonica.—Of all the choice plants to be met with in Calcutta, none perhaps is so much coveted and prized as the Camellia ; indeed, it is rarely seen except in the collections of those who have the facility of procuring it direct from China. If thought worth the expense and trouble, it might, no doubt, be obtained with ease from Europe ; but in this country there appears no prospect of its being brought to exist long in a thriving condition. Three years, it is said, is the longest period that it continues to blossom satisfactorily here ; after that it begins to die off, or produce only worthless flowers. It must, however, be remembered that even in England this plant will not bear exposure to the sun but to be cultivated successfully, requires to be screened from its rays, by being placed on the north side of a wall, or in some other way. Perhaps to the neglect of this precaution, its want of success in India may be in some measure owing. It blossoms towards the end of the cold season. Requires a light rich soil.

On the hills it comes to perfection, and should be treated in the same way as in England. A green-house is the best place to grow it in.

Succeeds at Wellington and Ootacamund on the Nilgherries. Recommended to be cut well back after flowering.

THEA.

TEA-PLANT.

T. Chinensis.—The three kinds of plant known in Tea-plantations by the names of the China, the Assam, and the Hybrid, though very distinct in habit and peculiarities, are decided to be but the same species. The several sorts of Tea of commerce owe their distinction to age of the leaf when gathered and the process of manufacturing it, and may be obtained indifferently from any variety of the plant.

The leaves are elliptical, saw-edged, and of a deep-shining green, contrasting well with the flowers, which resemble much those of a Bramble, more interesting from association than from any beauty they possess.

GUTTIFERÆ.

MESUA.

IRON-WOOD TREE.

M. ferrea—Nâgsura.—A small tree commonly met with in Assam, and in Lower Bengal, of great beauty, pyramidal in form, with dense foliage of small leathery lancet-shaped leaves, polished on the upper, and hoary white on the under-surface which on first putting forth in March are of a brilliant crimson tinge, and make the tree resemble a flame of fire, particularly when the morning or evening sun is upon it; bears in April, in great profusion, large white four-petalled flowers, with large yellow eye formed of its numerous crowded stamens which scent the air with a delightful fragrance for a wide distance, around. Propagated by seed, which must be sown where the tree is to remain, as the young plants do not bear transplanting. Not suited for the hills, except in the south of India.

OCHROCARPUS.

O. longifolius.—A dense evergreen tree of the Western Ghauts. Cultivated in native gardens, where it is widely known by the local name *Surgi.* The long, simple, leathery leaves, dark-green on the upper and light-green on the under-surface afford grateful shade during the heat of the day. Flowers in axillary clusters on the trunk and limbs, polygamous, rose-coloured and sweetly-fragrant; usually infested by thousands of bees searching for honey. A very desirable avenue or compound tree; elevation in the south 2,500 to 5,000 feet. Raised from seed.

CLUSIA.

BALSAM, TREE.

C. rosea. A remarkably slow-growing evergreen tree from West Carolina. Confined to Botanical Gardens at present. Flower large, beautifully rose-coloured and glistening. Propagated from seed. Nearly all the indigenous trees of the Guttiferæ are highly ornamental, especially *Gracinia xanthochymus*, an evergreen of a perfectly conical form, and bearing a golden Mango-formed fruit It is best seen in the Coorg country.

CALOPHYLLUM.

ALEXANDRIAN LAUREL.

C. inophyllum—Sultâna Champa.—A tree of considerable size, native of India, commonly found near the sea coast, with most noble foliage, of large elliptical, rich, polished, dark-green leaves; bears in June drooping racemes of large, white, delightfully fragrant flowers; succeeded by numerous large seeds, from which it may be easily propagated.

HYPERICINEÆ.

HYPERICUM.

ST. JOHN'S WORT.

H. Chinense.—A small bushy shrub, two feet high, with neat pleasing foliage of narrow elliptical leaves, two inches long, nearly constantly in blossom, with cheerful, bright-yellow, many-stamened flowers; propagated by division.

H. pallens.—A poor little weedy plant, about a foot high; valueless for the garden. Also is met with *H. patulum*, and *H. elegans*.

H. mysorense.—An ornamental bush indigenous to the Western Ghauts, but rarely found in gardens. It is domesticated, or wild, in the Fort at Nandidroog, the latter being situated on the top of an isolated hill on the plateau of Mysore at an elevation of 4,850 feet. This is mentioned, as curiously enough, one has to travel more than a hundred miles towards the Western Ghauts, before the plant is met with in the wild state again. Fertile seed has never been secured. The fine yellow flowers are three inches across. Only suitable for the shrubbery in hill gardens.

TAMARISCINEÆ.

TAMARIX.

T. Gallica, var. Indica—TAMARISK—*Jâu*—*Pharâs*—A native of Europe, as well as of this country, in the northern parts of which

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it covers large districts as a common jungle shrub especially in dry salt areas; and is much in use with the natives for making baskets; very graceful and feather-like in its growth; particularly pleasing when in blossom, and covered with its numberless little spikes of small pink flowers.

T. dioica.—A native also of this country: a very graceful and ornamental shrub, of light feather-branches, somewhat resembling the Casuarina; exceedingly pleasing when in full blossom, as it nearly always is, with its little stems terminating in a spike of small lilac flowers. Found in the dry beds of streams and in dry salt areas.

PORTULACEÆ.

PORTULACA.

P. grandiflora.—Of which there are many varieties, both with single and double flowers. A bed of this plant when in full blossom has been aptly likened, for the brilliancy and variety of colour in the flowers, to a stained-glass window. Nothing in the garden can equal it in dazzling beauty of effect. The beauty of the bed, however, is of short duration, as the flowers do not open till ten o'clock, and close again by about two in the afternoon.

The seed should be sown where the plants are to remain, as they bear transplanting very ill. They do better in the open ground than in flower-pots. If sown on the ground in October on the plains, and in April on the hills, the seed will germinate, and the plants become of strong large, healthy growth before requiring to be watered; whereas in pots the soil soon dries, and the young plants on first germinating are either destroyed by drought from being left unwatered, or if watered by the force of the water as it issues from the watering-pot. The best way of growing this delightful annual is to make one or more small circular beds of fine mellow soil, in a conspicuous and sunny situation and having well watered them with a watering pot, shortly afterwards sow the seed; cover the beds with a *jhamp* or matting till the seeds germinate, and then remove it. To distribute the seed evenly, I have found it an excellent plan to mix a pinch of it well in a teacupful of dry silver sand, and sprinkle the mixture by throwing pinch after pinch over the ground; by this means it is made certain that the seed will not be sown too thickly, nor more of it fall upon one part of the bed than on another. After this a slight sprinkling of pure sand may be made, and the sowing then covered over with the *jhamp*.

To save seed, gather the seed-vessels a little before ripe, for if left to ripen on the plant the cap of the seed-vessel drops off, and the seed falls out and is lost. If the ground on which Portulaca has grown be left undisturbed, plants commonly come up self-sown the following season. The flowers are much visited by bees.

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P. meridiana.—A small pot-plant, ornamental for its pretty moss-like leafage.

PORTULACARIA.

P. Afra—SPECKBOOM—ELEPHANT'S FOOD.—A pretty little pot-plant, with small, succulent leaves; native of a lofty mountain near Cradock at the Cape, called after the Speckboom Mountain.

CALANDRINIA.

C. umbellata.—A beautiful annual; produces crowded umbels of crimson flowers of the size of a four-anna piece, which open only in the sunshine; does not bear transplanting well, but succeeds best with the treatment recommended for Portulaca. To have fine flowers, Sir J. Paxton directs that it should be watered once or twice with liquid manure. Sow in October on the plains, and in April on the hills.

CARYOPHYLLACEÆ.

DIANTHUS.

D. Chinensis—CHINA PINK.—One of the most beautiful and satisfactory of our cold weather annuals. Naturally a perennial plant, but best treated as an annual in this country; most easy of cultivation; best grown in large clumps, so as to produce a large expanse of blossom with flowers of endless variety, scarcely two alike. To keep up a succession of bloom, the flowers should be cut off as soon as they fade, and not be allowed to run to seed. Sow in October on the plains, and in March on the hills. May be sown any time in the drier parts of sub-tropical India. At places like Madras sow at break of N. E. monsoon and protect from rain.

D. laciniatus.—A variety of the last, lately introduced from Japan; bears very large, beautiful flowers of various colours, single and double, quite scentless. The seeds should be sown in October, and the young plants potted off singly into pots with a well-drained soil, and kept under shelter during the rains, afforded at the same time as much light as possible. Re-potted in the following October, or planted out in a soil well enriched with leaf-mould in the open border, they will blossom in great splendour during the cold weather; during which time also they may be easily propagated by layers. They blossom, too, in pots more or less all the rest of the year, but they require to be continually renewed.

D. Heddewigi.—Also lately introduced from Japan; bears large, superb crimson flowers, with petals prettily fringed. Cultivated in exactly the same manner as the last. Both are considered to be varieties of *D. Chinensis*.

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D. barbatus—SWEET WILLIAM.—The fine varieties of this plant, though they thrive well, rarely, if ever, open their beautiful trusses of bloom in the locality of Calcutta. The seed may be sown in October, and the young plants kept through the succeeding hot and rainy seasons, by sheltering them from the wet, without at the same time screening them too much from the light. In November, pot them singly in large pots with fresh and rather rich soil. During the dry weather they will be benefited by having their pots sunk in water to the rim for an hour or two every four or five days.

D. caryophyllus.—Comprises those lovely and varied fragrant flowers so well-known under the name of Carnation, Clove, and Picotee. In the locality of Calcutta the only specimen ever met with is a dull dark-crimson flower of poor description. Plants of choice kinds may be raised from seed, and preserved easily from year to year, but they obstinately refuse to blossom.

In the north, on the other hand, no plants succeed more satisfactorily. Seed of the finest kind is expensive, but it rarely fails to germinate freely, and well repays the additional cost. It should be sown in October. The young plants should be put out about March, in a prepared piece of ground, so raised that water will not stagnate : it will then be found that they can bear without taking much harm, under full exposure to sun and rain. Should, however, a little protection be considered expedient, it is of the utmost importance not to overdo it, as the absence of sufficient light is fatal.

In October or November each plant may be put in a medium-sized pot in a compost prepared of equal parts of loam, vegetable mould, decayed cow-manure and a little sand (in South India a much smaller quantity of vegetable soil is used, more gritty matter, and a good deal of horse-manure from an old hot-bed). From the cow-manure the large white grubs must be carefully picked out. By the above mode of cultivation at Ferozepore, Firminger had a large collection of plants, giving in the month of March a splendid display of beautiful flowers of nearly every variety.

They are easily propagated by pegging down the longer side stems in their pots ; if this be done in November they very soon make roots, and form fresh plants. Or sink a flower pot in the ground in a shady place, half-fill it with fine river sand ; insert cuttings, well water them, and cover the pot with a pane of glass. Adopting this latter method, Firminger met with much success in increasing his plants. On the hills all the foregoing can be cultivated as perennials, as they usually are, and increased by cuttings.

SAPONARIA.

S. calabrica.—A dwarf annual, very easy of culture, and requiring no care ; bears deep, rose-coloured flowers of the size of the Forget-me-not ; when blossoming profusely, has at the distance an effect like that of bright Heather. Sow in October on the plains. and in March on the hills.

S. *officinalis*.—A pretty herbaceous plant, about 15 inches high ; commonly in blossom. Flower pale pink, somewhat resembling, but inferior to, that of the annual Phlox. Propagated easily by division of the roots. Can also be raised by seed in October, or nearly all the year round on the hills.

SILENE.

CATCHFLY.

A genus of annuals bearing small pink flowers ; ornamental only when grown in clumps and blossoming in great profusion. S. *Armeria*—Lobel's Catchfly.—Bears its flowers in compact heads, and for that reason one of the most desirable of the genus. S. *pseudo-atocion*—Pleasing for the freshness of its leaves, but in this country bears its flowers too scantily to be very attractive. Somewhat similar in character are S. *pendula* and its varieties. Sow in October on the plains, and in March on the hills.

LYCHNIS, Syn. VISCARIA.

L. *viscaria* and L. *oculata*.—Bear pretty pink campion and reddish flowers, but require to be grown in large clumps, as the flowers are only effective when produced in large numbers. Sow in October on the plains, and in March on the hills.

L. *chalcedonica* and L. *grandiflora* are perennial herbs domesticated on the hills. The former has scarlet and the latter coppery-orange coloured flowers. Easily raised from seed ; but not of much importance, except to revive early associations.

GYPSOPHILA.

G. *paniculata*.—A perennial herb of 2—3 feet bearing panicles of numerous rather small white flowers. Very pretty, but needs a cold station. Raised by seed and division. There may be one or two other species on the hills. All are graceful-looking herbs with grass-like foliage. G. *elegans* is now a florist's flower with several desirable varieties.

AGROSTEMMA.

ROSE CAMPION.

A. *coronaria*.—This pretty perennial with, possibly, one or two other species are found at hill sanitaria.

A. *cœli-rosa*.—An annual with beautiful rose and white flowers produced in great profusion, is known as the Rose of Heaven.

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CERASTIUM.

C. tomentosum—SNOW-IN-SUMMER.—This well-known white downy herb, so much used as an edging plant in summer bedding at home, succeeds as a rockery plant on the hills. Propagated by division. It is perennial.

POLYGALEÆ.

SECURIDACA.

S. virgata.—A large, handsome, scandent shrub, with elliptical leaves two inches long; if unsupported, of a very sprawling habit, covering a large space of ground. Blossoms in March with an unlimited profusion of sprays of lively rose-coloured flowers, having much of the appearance of an Indigo. Propagated by layers. *S. Browni; S. scandens.*—Plants of these last two are met with in the Calcutta Botanical Gardens. Firminger had not seen them in blossom. *S. erecta* is an American species with red flowers, all are propagated by layers and cuttings.

PITTOSPOREÆ.

PITTOSPORUM.

P. Tobira.—A large, bushy, very handsome shrub, four feet high; native of China; with leaves two or three inches long, of obovate form, smooth-edged, coriaceous, of a cheerful, shining green. Its merit as an ornamental plant consists entirely in its neat dense foliage; for though Mrs. Loudon says that in England "it bears large terminal clusters of white, very fragrant flowers nearly all the summer," it seldom, if ever, blossoms here.

P. Tobira variegatum.—A pleasing variety of the above, having its leaves variegated with white.

P. verticillatum.—A shrub bearing in most respects a strong resemblance to the last; bears in the cold season, terminal clusters of white flowers, perfectly inodorous, very small and not very interesting. All of the above are propagated by cuttings in February.

P. floribundum.—A desirable evergreen tree at 4,000—5,000 feet. Flowers yellow, in ample terminal corymbs: succeeded by equally abundant clusters of pretty yellowish fruit, the size of Rowans. Raised from seed.

SOLLYA.

AUSTRALIAN BLUEBELL CREEPER.

S. heterophylla.—A slender climbing plant; bears small cymes of five-lobed flowers, not large, but of a beautiful azure blue. Dr. Voigt mentions it as growing here and blossoming in December.

Firminger never met with it, nor heard of its being here. *S. salicifolia* is a Willow-leaved form of the above. Propagated by layers.

BARSARIA.

B. spinosa.—A small ornamental tree of Australia. This species has taken kindly to the Mysore climate, where the white, fragrant, privet-like blossom, renders it a conspicuous and pleasant object for several weeks in the year. It is an upright, rather compact-growing tree of 25—35 feet. Easily raised from seed.

BIXINEÆ.

BIXA.

B. oreliana.—ANATTO-TREE.—A small, rather common tree, the seed of which yields the well-known Anatto dye ; has dense handsome foliage, with large heart-shaped leaves : bears in great profusion, towards the end of the rains, panicles of remarkably beautiful flowers, resembling large Peach-blossoms : if pruned and kept of moderate size, an ornamental plant at all times : easily propagated from seed. Roxburgh says, the variety that bears white flowers is a native of this country ; but that in plants reared from West India seed the flowers are rose-coloured.

COCHLOSPERMUM.

C. gossypium—YELLOW-FLOWERED SILK COTTON TREE.—A small, deciduous tree of dry hills and forests. It breaks into blossom early in the hot season (March to April) and is then a conspicuous object all over the tracts where it is plentiful. Rarely found in private gardens. A few specimens will be seen at the entrance to the Lal Bagh, at Bangalore. The flowers, which precede the leaves, are 3—4 inches in diameter, golden-yellow, in terminal clusters, and can be seen a long way off, Capsules softly tomentose or silvery pubescent, the form of a goose's egg but larger. On dehiscing these discharge their seeds, to which is attached a large quantity of pure white floss or so-called silk cotton. The tree is propagated from seed.

FLACOURTIA.

F. sepiaria.—A thorny bush or small tree. The young bright green foliage, which accompanies the flowers at the beginning of the hot season, glistens as if it had just been varnished. Flower white changing to yellow ; very fragrant. Propagated from seed.

Hydnocarpus Wightiana and *alpina*, are splendid avenue trees for hill regions in the south of India. Raised from seed when procurable.

VIOLACEÆ.

VIOLA.

V. tricolor—HEARTSEASE—PANSY.—Though a perennial, the Heartsease must, in this country, be cultivated as an annual, and raised fresh from seed each cold season, for it is only in very rare cases that it can be preserved through the hot and rainy seasons. The seed should be sown about the middle of September in Upper India, in March on the hills, and in Calcutta and Lower Bengal in October, and the young plants, when having formed about six leaves, be pricked out into small pots, one in each or three in eight inch pots. They should be removed carefully, so as to disturb the soil as little as possible, for some of the seeds do not germinate till a long time after others. The Heartsease likes shade and plenty of water, and a soil well enriched with old cow-manure. It is important, however, that the soil should be rendered of an open nature, by the addition of river sand, or the plants are apt to turn yellow and sickly.

The following mode of treating the plant is given by Sir J. Paxton :—

"When grown in pots, train the plant upon a single stem, until it has attained the height of one foot, or eighteen inches (which it will readily do), then pinch off the extreme points; it will throw out side branches in profusion, and will have a strikingly pleasing appearance."*

The Heartsease, however, is a Florist's Flower, and plants raised from saved seed may probably, with all the trouble bestowed upon them, turn out worthless, particularly if care has not been taken to sow seed saved from the finest sorts. It can be grown as a perennial on the hills, where the plants can easily be raised from cuttings put down in sand under glass.

V. odorata—SWEET-SCENTED VIOLET.—Of this old familiar flower several varieties, both single and double-flowered, are now successfully cultivated in India, even in warm stations where one does not expect to find them. But, of course, the cooler the situation, the better the results usually are. Exposure to heavy or frequent rain is fatal to blooming in this country. Vegetative growth must also be kept in check by transplanting or reporting the plants once or twice a year. Decayed horse-manure (8—12 months old) is a good stimulant for the production of flowers. The morning sun is beneficial, but not full exposure during the warmest part of the day. An open porch or verandah facing east affords a good exposure. A few of the best varieties in cultivation are—*Neopolitan*, double, pale lavender, very sweet. *Czar*, large single, blue blooms profusely. There is also a white-flowered variety of this *Compte Brazza*, a fine double, white, highly-scented variety. *Marie Louise*, one of the best, highly floriferous lavender and white, very large and sweet-scented. *Russian*, large blue, free flowering. For other varieties see catalogues.

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*"Magazine of Botany", Vol. III, p. 6.

V. cucullata—THE HOODED VIOLET.—This and the two following, which much resemble the preceding, and blossom likewise in the cold weather, are hardly species ; but being scentless are not much valued. All are propagated by division of the roots and offsets. *V. primulæfolia, V. serpens,* bearing small white flowers of little interest. The heart-shaped, acuminate leaves are pretty.

V. canina—THE DOG VIOLET.—This is found wild on the Western Ghauts and Pulney hills, elevation 6,000—8,000 feet.

CORYNOSTYLUS.

C. albiflorus.—A handsome tropical American climber, with polished, serrated, entire leaves, and large, attractive, white flowers. Propagated by layers during the rains. On the hills, grow in a stove.

RESEDACEÆ.

R. odorata—MIGNONETTE.—No particular directions need be given for the culture of this familiar, sweet-scented plant, except that it bears transplanting ill, and that the seed should be sown in October thinly in patches where the plants are to remain. It may be kept alive and in blossom a very long time, if the flower-heads be cut off when they begin to form seed-vessels. It will succeed in nearly any soil, and in gardens where it has been grown one season it will come up self-sown the following.

To form what is called the Tree-Mignonette, Mr. Cuthill directs as follows :—

> "Sow in a four-inch pot. When up, clear off all the plants but the one in the centre. As it grows, train it upwards to a stick, until it is a foot high or two, if you please. Do not allow any side-shoots to grow on the stem, and remove all leaves to within a few inches of its top. When the plant gets as high as you wish, top it ; and then it will throw out side branches. As they advance, pinch off their tops, till you have formed a nice bushy head to your plant ; and, above all, do not allow any bloom to appear until it has become strong.
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> "Mignonette delights in a sandy loam, not too light ; but being a gross feeder, a little diluted manure-water may be given once a week with advantage. If this is contemplated, the mould need not be made so rich in the first instance."

It must be mentioned, however, that the large bushes, between two and three feet high and the same in breadth, exhibited in England, are the result of two years' growth, and the above plan can only be carried out on the hills. Old brick and mortar rubbish, when nicely sifted, is most agreeable to this plant ; so is cow-dung in an advanced state of decay.

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CAPPARIDEÆ.

CLEOME.

C. viscosa.—Grows with an erect stem, two feet high; bearing rose-coloured flowers, curious for the immense distance between the pistil and the other parts of the flower. The flowers, poor in themselves, form a pretty object clumped several together in a tuft-like head on the summit of the plant. Sow the seed in October on the plains and in March on the hills.

C. rosea and *C. speciosissima* are fine showy annuals of 2—3 feet, bearing large terminal heads of beautiful rose-coloured flowers. Very useful in the centre of a large round bed, or in the back row of a floral border. A white Cleome has been reported from Maymyo.

CAPPARIS.

C. horrida.—An extensively straggling thorny bush. The young shoots and leaves have a rich, glossy, chestnut-coloured tinge, contrasting beautifully with the numerous large white tassel-formed flowers, borne in February and March. Unsuited for the garden, but forms an excellent fence.

C. tryphylla.—A remarkably pretty, compact, bushy, small shrub with round-oval, rigid, deep-green leaves, an inch long; ornamental only for its foliage. Shy of flowering.

C. Zeylanica.—Somewhat similar to the first named. Flower white, changing to yellow and brown. The large egg-formed fruit is attractive in its changeable yellow and crimson tints of colour.

C. sepiaria.—This scandent, small-leaved, intensely thorny shrub, makes a good hedge or fence. All the above are raised from seed.

CRATÆVA.

C. religiosa.—CAPER TREE.—This small deciduous tree is one rarely found in gardens. Flower large yellow, changing to purple, often found on the banks of streams and in native graveyards. Raised from seed.

CRUCIFERÆ.

MATTHIOLA.

M. annua—TEN-WEEK-STOCK—GERMAN STOCK—BROMPTON STOCK.—These are all varieties of the same, and differ very little from each other except in the size and form of their blossoms. English seedsmen's catalogues contain many so-called varieties. Stocks thrive vigorously enough in the vicinity of Calcutta till they are just about to blossom, when they all but invariably are infested with a minute kind of insect, assume a cankered appearance, and become utterly worthless. The only way to avoid this is to keep a careful watch on the plants, and upon the first sign of the insect, to sprinkle the plants with wood ashes. Firminger raised numbers year after year, but never succeeded in obtaining a single satisfactory spike of blossom. In Upper India, on the other hand, it thrives and blossoms to perfection.

The seed should be sown on the plains in October, in the open ground, in a spot protected from the effects of both sun and rain; when sown in pots the young seedlings are exceedingly apt to damp off. On the hills, the seed must be sown in February and March, in pots or pans, in frames, with bottom heat if possible; or in the green house. The soil should be sandy and light, and the young plants should be starved of water till about two inches high, when they should be transplanted into very rich soil. Sir J. Paxton remarks: "those which remain where sown will be better plants, as stocks are very much checked by transplanting." This, indeed, accords with most people's experience. One thing moreover is certain, that the attempt to move a stock when in blossom, or on the eve of blossoming, is at once to destroy it.

KŒNIGA.

K. maritima—SWEET ALISON OR ALYSSUM.—A dwarf, pretty unpretending annual, bearing small conical heads of little white flowers that emit a pleasing honey-like fragrance. Sow in large patches in October on the plains, and in March on the hills. The plant will be in full blossom by the middle of December on the plains, and in May on the hills. Obtain K. m. VARIEGATA also.

IBERIS.

I. odorata—WHITE CANDYTUFT.—Of easy culture, thriving well everywhere; plants raised in clumps in the border present a large pleasing mass of white blossom. Sow in October on the plains, and in March on the hills.

I. umbellata—PURPLE CANDYTUFT.—Of somewhat larger growth than the preceding; produce handsome showy masses of pale purple blossoms, but sometimes rather shy of doing so. The English seedsmen's catalogues contain lists of other varieties also; but the above can always be relied upon.

CARDAMINE.

LADY'S SMOCK.

A few perennial species of this herb do well on the hills in moist shady places. There are also a number of indigenous species mostly found in the Temperate Himalaya. Flowers white and purple

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MALCOMIA.

M. maritima—VIRGINIA STOCK.—A dwarf, unpretending annual, well adapted for an edging or to be planted in clumps, producing then in effective masses its small lavender-coloured flowers. Sow in October on the plains and in March on the hills, in enriched soil.

ERYSIMUM.

E. Perowskianum—YELLOW STOCK.—Resembles an orange-coloured Wall-flower but with much larger heads of blossom. Sow in the border in October on the plains, and in March on the hills; no care required in its culture.

E. Arkansanum.—Like the above, but with pale yellow heads of flowers, bearing rather too great a resemblance to those of the Turnip or Mustard. *E. pulchellum* is a pretty flowering plant.

CHEIRANTHUS.

C. Cheiri—WALL-FLOWER.—This is a perennial, but is cultivated as an annual on the plains. The seed should be sown in October, and treated in the same way as the stock. On the hills sow in March, and transplant into pots and borders, where the plants will go on blossoming throughout the year. Must be protected in the winter.

Succeeds well in the United Provinces: but only indifferently at Ootacamund in the south of India.

HELIOPHILA.

H. arabioides.—A small plant, bearing small, brilliant blue, not very remarkable flowers, rather pretty; grown in pots. Sow in October on the plains, and in March on the hills. *H. pilosa incina* is the new name for this plant.

LUNARIA.

HONESTY.

L. annua.—An attractive annual or biennial with violet-lilac flowers. Sow on the hills only.

HESPERIS.

ROCKET.

H. matronalis—DAMES' VIOLET.—The common Rocket, of which there are some superior varieties; especially the double flowering. The latter require to be propagated by division. All are useful border perennials on the hills. Useless on the plains.

SCHIZOPETALON.

S. walkeri.—A small plant bearing exceedingly pretty, pure-white, deliciously-fragrant flowers, with the petals cut in a most curious way. It likes a light sandy soil, and should be sown in the spot where it is to remain, as it bears transplanting very ill; it is of delicate habit, and on the plains very apt to perish just as the flowers are about to expand. Sow in October on the plains, where it blossoms by the end of January. On the hills sow in March.

FUMARIACEÆ.

DIELYTRA (Dicentra)

D. spectabilis.—This beautiful herbaceous shrub, remarkable for its curious, pendulous, locket-shaped flowers (rosy crimson), was sent in 1856, by Mr. Fortune, from China to this country, but was found unable to exist in the climate. It will probably succeed at cold stations on the hills.

CORYDALIS.

FUMEWORT.

An ornamental genus of smooth glaucous herbs with pretty flowers of nearly all colours. A few species grow in hill gardens. Easily propagated from offsets.

FUMARIA.

FUMITORY.

F. persiflora.—A pretty garden weed at Bangalore. Flower rosy-purple, self-sown.

DICENTRA.

LYRE FLOWER.

A genus of large herbs with showy flowers. A few species are cultivated at hill stations. *D. Canadensis*—Flowers white. *D. chrysantha*—Flowers golden-yellow. *D. formosa*—Flowers bright red. Propagated by division of the root-stock and by root-cuttings.

PAPAVERACEÆ.

PAPAVER.

P. somniferum—POPPY.—The varieties of Poppy, both as regards size and colour, are very numerous, bearing the names severally of Paeony, Ranunculus, and Carnation-flowered. The seed should

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be sown in October on the plains, and in March on the hills, in the open ground in light rich soil, where the plants are to remain, as they do not bear transplantation. Seed procured from Europe cannot often be depended upon to germinate ; hence, when a good kind has once been raised, care should be taken to save the seed of it from year to year. *Papaver Murshelli* is a perfect double variety of this species. The poppy succeeds best in a sandy loam.

P. Rhæas—FRENCH POPPY.—A smaller plant than the preceding, and distinguished from it by its much-divided leaves and hairy-flower-stalks. This includes the common field Poppy at home, of which there are many improved varieties

Two most popular strains are the Iceland and Shirley Poppies ; the former consisting of beautiful varieties of PAPAVER NUDICAULE and the latter having a white edging to the red petals. Unlike other Poppies, these two classes last for a long time when cut, and are most useful for the decoration of rooms. P. ORIENTALE also affords some strikingly beautiful varieties. Perennial species succeed on the hills. Same treatment as for the preceding.

ESCHSCHOLTZIA.

E. Californica—CALIFORNIAN POPPY.—A very showy plant with hoary green, much-divided foliage ; bears a profusion of large, expanded, bright-yellow flowers. In the gardens of Upper India it is always to be counted on as a splendid ornament during the cold months ; but, in the vicinity of Calcutta, though it grows vigorously, and in some seasons affords a tolerable display of flowers, it more commonly fails of yielding a single blossom, not becomes at all the more disposed to do so from being preserved, as it may be, till the following cold season. The seed should be sown in October, where the plants are to remain, as "when transplanted," Sir J. Paxton observes : "they are a very long time before they commence growing again." *Hunnemannia fumariæfolia* is in many respects very similar, and blossoms freely in the middle of April. On the hills the seed should be sown in March.

There are several varieties, varying in colour from pale straw to deep yellow and pink.

PLATYSTEMON.

P. Californicum.—A small delicate plant of trailing habit, with grass-like foliage of ash-green tint ; bears beautiful little snow-drop-like flowers of a pale lemon colour. The plants are attached to the soil by such a slender, thread-like stem, that they cannot be transplanted without being greatly injured if not destroyed. Firminger found that it did not succeed well in Bengal. The seed should be sown in Upper India in October, and on the hills in March, where the plants are intended to remain permanently.

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NYMPHÆACEÆ.

This Order consists entirely of aquatic plants, some of which are very ornamental in the garden that has water suited to contain them. Most may be raised from seed. Sow the seed in a shallow earthen pan, such as a flower-pot feeder, filled with earth ; and then place this pan into a somewhat larger and deeper vessel, which must be carefully filled, and afterwards kept constantly supplied with water. When the seeds have germinated, remove the small pan of earth containing them from the larger vessel, and cautiously lower it just as it is, in the piece of water where the plant is desired to grow.

Some of the small species may be grown in large earthen vessels sunk to the rim in the earth, and kept filled with water. These, when properly attended to, have a very pleasing and refreshing appearance, especially if in some situation near the entrance to the house, surrounded by potted plants of different kinds.

EURYALE.

E. ferox.—A small plant, native of India ; remarkable principally for its curious bristling foliage ; flowers small blue, and of no interest whatever ; well adapted for growing in an earthen vessel, as above described.

VICTORIA.

V. regia.—This noble aquatic, native of South America, thrives well in the tanks about Calcutta, and produces its magnificent blossoms principally in the cold season. The flower is of immense size, as much sometimes as a foot in diamater, white tinted with rose-colour, and passes through three distinct stages in the process of expanding with the interval of a day between each stage, and is almost equally beautiful during each of these stages. When perfectly expanded, it almost immediately dies off. By some the leaf will be considered an object of even as much interest as the flower. In its upper surface it resembles a large round tea-tray, three or four feet in diameter, laid upon the water ; and in its lower surface it presents a most curious and complicated network of fibres, from which project a very formidable array of thorns. The plant is found not to exist more than two years, when its place must be supplied by a fresh one raised from seed, which in the vicinity of Calcutta it bears abundantly. If the seeds have to be conveyed to a long distance. it has been found that they will only retain their vitality by being kept in phials of pure water. All attempts at introducing the plants into this country failed till Dr. Wallich resorted to this plan. The seeds are sometimes very long in germinating. Mr. M'Murray states :—

"Two of the Victoria regia seed, presented to the Society by the

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late Dr. Wallich on the 8th November, 1851, have germinated during this month, after lying in the gumlah of mud and water for two years and nine months." *

NYMPHÆA.

N. cærulea.—Native of Egypt ; a small and most desirable plant; admirably adapted for growing in some conspicuous place in a large earthen vessel sunk to the rim in the ground. Its beautiful many-petalled flowers are of the size of a Tulip, blue with a yellow centre, and emit a most delightful fragrance, like that of the Orris-root. Bears seed abundantly. *Syn. N. stellata.*

N. stellata.—Native of the jheels of Bengal where, when in blossom and seen at a little distance, it might be taken for the last ; but the flowers are not so double, and have no scent. There are several varieties.

N. pubescens and *N. edulis.*—Are white Water-Lilies, common in waste pieces of water about Bengal ; but have no pretensions to the beauty of *N. alba* so common in England. *Syn. N. lotus.*

N. rubra.—Native of Bengal ; very handsome when in blossom with its large and brilliant red flowers. *Syn. N. lotus.*

N. versicolor.—Native of Bengal ; bears large rose-coloured flowers. *Syn. N. stellata var. versicolor.*

NELUMBIUM.

N. speciosum—THE SACRED LOTUS—WATER-BEAN.—*Puddum—Kunwul.*—A large and, when in blossom, very beautiful plant, common in tanks and jheels in every part of India. Bears in the hot season very large, double, rose-coloured handsome flowers. It produces seed abundantly in curious, drooping, cone-shaped seed-vessels. The seeds are sown by enclosing them in a ball of clay, and throwing them into the water. A variety has nearly pure-white flowers.

N. luteum—THE YELLOW WATER-BEAN.—Native of Carolina. There used to be a small plant in the gardens of the Agri-Horticultural Society.

BERBERIDEÆ.

BERBERIS.

BARBERRY.

A rather numerous genus, several species of which are regarded as highly ornamental in English gardens. The four or five that can grow on the plains of Northern India are not objects of much beauty.

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*"Journal of the Agri-Horticultural Society," Vol. IX, p. 49.

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B. asiatica.—A middle-sized shrub, with thorny stems and leaves, in general aspect of a pale ashy green. London describes it thus:—"The flowers are yellow and beautiful, berries purplish with a fine bloom, and decaying leaves yellow and red."

B. aristata var. floribunda.—Very similar in general appearance to the last.

B. Fortuniana.—A deep-green smooth bush, native of China, introduced by Mr. Fortune. Leaves pinnate, with 3—4 pairs of leaflets and an odd terminal one. Bears pretty racemes of small bright yellow flowers in the rains, agreeably relieved by the dark green foliage of narrow, lanceolate, saw-edged leaflets. No doubt an exceedingly beautiful plant grown in a climate that suits it.

B. nepalensis var. Leshenaultii—HOLLY-LEAVED BARBERRY.—Native of Nepal and Nilgiri Mountains. Mentioned by Dr. Voigt as blossoming here in January. Propagated by cuttings and seed.

NANDINA.

N. domestica—SACRED BAMBOO OF CHINA.—A very handsome shrub from 5—7 feet high, with light and airy bipinnate foliage of small, narrow, Myrtle-like leaflets. Mr. Fortune says that :—"In China, in the month of January, large quantities of its branches are hawked about the streets ; each of the branches is covered with a large bunch of red berries, not very unlike those of the common Holly, and when contrasted with the dark shining leaves are singularly ornamental." Large plants have been for many years in the Calcutta Botanical Gardens and thrive well there, but rarely blossom. The plant is not often met with in Upper India. The flowers, borne in panicles, are of a dull or creamy white colour, with yellow anthers and of little interest. Propagated by division.

MENISPERMACEÆ.

The climbing plants of this tropical family are more of economic than ornamental value.

TINOSPORA.

T. cordifolia.—An indigenous climber, frequently met with in gardens and growing wild in the jungle. Leaf smooth, cordate, flowers diœcious, yellow, in short axillary racemes. Unimportant.

ANAMIRTA.

A. Cocculus.—This is also a glabrous climber with large ovate to cordate leaves of a dark-green colour

Flowers greenish-yellow. Fruit black, the size of a large Currant.

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ANONACEÆ.

ARTABOTRYS.

A. odoratissimus.—A large shrub, native of this country, of scandent tendency, with dense foliage of handsome, lanceolate, glossy, pure green leaves, bears principally in the rains, moderate-sized irregular-formed flowers, very similar to those of the Custard-apple, of a heavy, pale yellow colour, generally hidden out of sight under the leaves, whence they emit agreeable gusts of perfume, somewhat like that of over-ripe Apples: very ornamental when covered with its small, golden, Pear-like fruit. Propagated by seed and cuttings during the rains.

CANANGA.

C. odorata.—A tall tree with large drooping yellow flowers three inches long. Very fragrant. Cultivated in tropical India. *Syn.* UVARIA ODORATA.

POLYALTHIA.

P. longifolia.—A handsome evergreen tree with long tapering; lanceolate, shining leaves. Cultivated in gardens and compounds, but slow of growth. Makes a beautiful avenue. Occasionally spoken of as the "Mast Tree," the trunk being very tall and straight. Flowers creamy-green. Fruit in clusters all over the branches, not unlike Coffee berries. Easily raised from seed. *Syn. Uvarialongifolia.*

There are several other fine trees of this genus suitable for cultivation on the plains of India.

MAGNOLIACEÆ.

TALAUMA.

T. pumila.—A very delightful shrub, about five feet high, native of China, and not uncommon in the Calcutta gardens; would be very handsome if the foliage only remained in a healthy condition, but owing to some unexplained cause, has nearly always a shabby appearance from a great part of each leaf becoming decayed. This, Firminger thought, might possibly arise from its being usually planted in a situation too exposed to the sun, but he noticed plants in the conservatory at Kew in the same condition. Bears at nearly all seasons, but principally in the cold weather, pure-white globular flowers of the size of a Tulip, opening in the evening and falling off the next morning. A single flower will perfume the garden for a great distance around with its quince-like fragrance. Propagated by layers and by cuttings in sand put down in the rains.

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MAGNOLIA.

M. grandiflora.—A small tree, fifteen feet or more in height; native of Carolina; noted for the beauty of its noble laurel-like foliage; considered one of the choicest plants in Calcutta, where it thrives with difficulty, and only as a shrub of moderate size. Bears in April its grand white fragrant flowers, and in August occasionally ripens seeds, which are of the size of a Tamarind-stone, and of a brilliant red. Propagated by gootee, but with extreme difficulty. Not difficult to grow in the south. Can be grafted readily.

M. fuscata.—A small ramous shrub, two or three feet high; native of China; with exceedingly neat foliage, somewhat resembling that of a Camellia: bears in March small pale yellow or cream-coloured flowers of a deep dull crimson within, of the size and something of the form of a pigeon's egg, exquisitely fragrant, especially after rain.

M. pterocarpa.—A large handsome tree, native of India with large noble leaves; bears in April in unbounded profusion its large, pure-white globular-formed, finely fragrant flowers. The last two propagated by layers and cuttings.

The following varieties are also to be met with in Calcutta:—

M. anonæfolia; conspicua; mutabilis pumila; Soulanceana Nigra and *purpurea*, all recent introductions. *M. Campbellii*, a splendid Sikkim species, should succeed at Darjeeling.

MICHELIA.

M. Champaca—Chumpa.—A small tree, about twenty feet high, very common in Bengal, with very fine foliage; bears, principally at the beginning and end of the cold weather, numerous large narrow petalled flowers of a dull, lifeless, lemon colour, emitting for a wide distance round a most delicious fragrance.

After flowering, the tree often becomes so exhausted by the prodigious quantity of large yellow berries it ripens, as hardly to recover itself and produce a flower for a year or more afterwards. This, no doubt, might be obviated by timely removal of the berries as they set. In the Mulnad, or hill tract of Mysore, this handsome evergreen tree attains a great size, and is an object of much admiration. Rare specimens grow to nearly 100 feet, having a circumference of 20 feet at the base of the trunk. Kanarese name *Sampige.*

M. nilagirica is a smaller evergreen tree with white flowers. An intermediate variety with large, pale lemon or nearly white flowers, is multiplied by grafting. Very popular with the Hindus. Propagated by seed.

DILLENIACEÆ.

DILLENIA.

D. speciosa—Chulta.—A large and very common tree of this country, remarkably handsome for its foliage of noble, pointed, elliptical leaves; bears in July very large, pure-white, fragrant flowers, with yellow anthers; very ornamental likewise in the cold weather, when bearing in abundance its large, round, green fruits of the size nearly of a child's head. Propagated by seed during the rains.

DELIMA.

D. sarmentosa.—A scandent coarse looking shrub, with leaves like those of the last; bears loose panicles of small, yellow, very fragrant flowers. Propagated by cuttings in the rains.

RANUNCULACEÆ.

CLEMATIS.

VIRGINS' BOWER.

Several species of this extensive genus of beautiful-flowered climbing plants have been introduced; but have for the most part evinced a great reluctance to blossom. They thrive remarkably well on the hills. Besides *C. brachiata,* the native *C. Gouriana,* and the Spanish *C. Viticella,* there are met with the following :—

C. Cadmia.—A very beautiful plant, producing in the cold season large star-formed flowers of five pure violet petals; with dense and very pretty foliage of small ternate leaves'. It requires shade, and dies down in the rains.

C. Flammula.—The common European species, so well known for the exquisite fragrance of its blossoms, which, during the rains, it puts forth in clusters of small white flowers from its dense small-leaved ternate foliage.

The Clematis is now grown in England as a Florist's flower, and many varieties of great beauty have been raised by hybridization. All the varieties grow well in our grass conservatories, and love a light rich soil of leaf-mould and sand. Propagated by layers put down in the rains.

ADONIS.

A. autumnalis—FLOS ADONIS—PHEASANT'S EYE.—A cheerful little plant, with dense foliage of deep-green, finely-divided leaves, out of which peer forth its small vivid crimson flowers; thrives best in a moist and shady situation; sow in October.

NIGELLA.

N. *Hispanica.*—DEVIL-IN-A-BUSH—FENNEL-FLOWER.—A not very pleasing annual ; interesting principally for the curious way in which the largish blue flowers are surrounded by the Fennel-like foliage. Sow in October : it requires shade and moisture.

DELPHINIUM.

There are many trade varieties of this beautiful flower now to be had, both annual and perennial. In India the annuals have, so far, been mostly grown. D. AJACIS is the wild annual and several trade varieties have been developed from it. The term "rocket larkspur" has been given to these on account of their straight flowering shoots, and the term, "candelabrum larkspur" to those coming from D. CONSOLIDA, another wild annual. The colours of Delphiniums are from white through all shades of blue to deep blue with black centres, and include some mottled flowers. Delphiniums grow well in any good soil. They do splendidly in deep rich loam mixed with sand. They are essentially flowers for exposed beds and borders and loathe shade. On the plains generally sow at the end of the rains. In the hills sow in early spring. The plants make excellent table decorations.

ACONITUM.

A. *Napellus*—COMMON MONK'S-HOOD.—This is only found at the coldest hill stations.

ANEMONE.

WIND FLOWER.

A. *Coronaria.*—The Florist's Anemone, a small tuberous plant, producing flowers of extraordinary beauty, single and double, in almost endless variety. The tubers must be imported each season from England in time for planting in October. They blossom about March. Their cultivation in Calcutta is attended with little success, and even as high up as Allahabad Mr. S. Jennings informed Firminger his attempt to grow them proved a failure. They succeed well generally in the United Provinces. When at Ferozepore, Firminger imported tubers, which blossomed well without much care bestowed upon them. While there he also raised plants from seed ; the seed, being of a woolly nature, is easily transmitted in a letter. He took up the young tubers on the approach of the hot weather, and kept them in a house till the following cold season, and then planted them in pots, where they blossomed very freely and beautifully. But he found that both imported and seedling tubers became worn out and worthless after once blossoming.

They require a light soil of common mould and decayed vegetable matter, or very old, rotted cow-manure and river sand. The tubers should be planted about two inches deep in a hole, into which a pinch of sand has been dropped. On the hills, where they thrive to perfection, the tubers should be put down in February and March.

A. Japonica.—A native of China, from whence it was sent here many years ago by Mr. Fortune, but, though thriving well, has never blossomed. The flowers, two inches across, pale pink, are very beautiful, and in England during the autumn are quite an ornament to the garden. There is a white variety, and one of great beauty named Honorine Jobert. Though a native of damp woods, on the edges of rivulets, it thrives well in common garden soil.

HEPTICA (Anemone)

This pretty flowering plant, so common in English gardens, is unknown in India, except on the hills, where *H. Japonica* grows freely.

RANUNCULUS.

BUTTERCUP.

R. Asiaticus.—The Florist's *Ranunculus*, with its numberless lovely varieties, including those of the sorts called Persian, Scotch, Turban, is cultivated in this country exactly the same as the Anemone.

AQUILEGIA.

A. vulgaris—COLUMBINE.—This pretty and familiar plant may be raised from seed in October, and preserved through the hot and rainy seasons till the following cold weather, when though thriving vigorously, it is seldom, if ever, disposed to blossom, at least in the locality of Calcutta. It blooms very freely in Upper India ; while on the hills several varieties are found growing in wild profusion during the rains.

PÆONIA.

PÆONY.

A genus of plants celebrated for their great splendid flowers. Pæonies have several times been introduced into this country, but their cultivation has been attended with no success whatever, as they are unable to bear the heat of the climate. Even in the more congenial locality, as it might be thought, of Ootacamund, the attempt to cultivate them has uniformly proved a failure. On the hill stations of the Himalayas they grow to great perfection, and should be treated as in England.

ERANTHIS.

E. hyemalis—THE WINTER ACONITE.—A tuberous-rooted herb with handsome yellow flowers preceding the leaves. Suitable for Himalayan hill stations. Propagated by division of the tubers.

TROLLIUS.

T. europæus—THE GOLDEN BALL or GLOBE FLOWERS.—This herb may be cultivated with the preceding species. Propagated from seed and by division of the roots.

THALICTRUM.

MEADOW RUE.

This graceful looking herb, which is not uncommon in gardens, caricatures the foliage of the maiden-hair Fern and the paniculate inflorescence of many grasses. A good plant for the rockery under shade. The species in cultivation is probably T. FOLIOLOSUM. Usually propagated by very careful division of the rootstock.

NARAVELIA.

N. Zeylanica.—A jungle creeper with curious yellow flowers, the sepals and petals being reduced to narrow strap-like appendages. Propagated by seed.

MURRAYA.

CHINA BOX.

M. Exotica—Kaminee.—This evergreen shrub of the Nat. Ord. *Rutaceæ*, is too well known to require a detailed description. M. PANICULATA is a somewhat larger form. Both are desirable garden shrubs. The pure white flowers, resembling miniature orange-blossoms scent the air deliciously during the short time they last. Propagated by layering and cuttings during the rains.

CLAUSENA.

C. heptaphylla—Pân Kapoor—Karan-phool.—A small shrub of the country, Nat. Ord. *Rutaceæ*. Of no decorative value; but when the leaves are bruised they emit a pleasant fragrance like that of the anise-seed. Propagated by cuttings.

ROMNEYA.

R. Coulteri—Nat. Ord. *Papaveraceæ*.—This rare herbaceous parennial is only found in hill gardens, where it becomes a bush of 3—4 feet, and flowers freely. The large whitish flower resembles an overgrown Poppy, and is very remarkable. Useless for the plains. Propagated from seed.

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HEDYSARUM.

FRENCH HONEYSUCKLE.

H. Coronarium.—A perennial herb or subshrub of the Nat. Ord. *Leguminosœ.* A pretty bushy plant with neat dark foliage, and bearing curled spikes of dull-red vetch-like flowers. The variety H. FLEXUOSUM has red flowers, tinged with blue. There is also a white-flowered variety. All are raised from seed, and do well on the hills.

MICROMEIUM.

M. integerrimum—Nat. Ord. *Rutaceæ.*—A small tree with large leaves; bears in March very small, greenish white, exceedingly fragrant flowers, and afterwards bunches of little bright orange-coloured berries, which when bruised, emit an overpowering fragrance. Propagated by cuttings put down in October. *Syn. M. pubescens.*

AKEBIA.

A. Quinata—Nat. Ord. *Lardizabalaceæ. Syn. Berberideæ.*—A twining shrub, with pleasing foliage of rich green, small, elliptical leaves, arranged five in a group; introduced from China by Mr. Fortune, who describes it as bearing "dark-brown flowers, not unlike those of Magnolia fuscata, and very sweet-scented." As figured in the "Botanical Register," the flowers are without petals, have three sepals, and are borne in loose recemes. Thriving plants have for some years past been growing in the Calcutta Botanical Gardens. It is said that it dreads humidity.

SPIRÆA.

This genus contains the old familiar Meadow-Sweet of our English fields, besides several beautiful cultivated species. Nat Ord. *Rosaceæ.*

S. Corymbosa.—Native of China; a small shrub of slender twiggy growth, about two feet high; very pretty, when in full blossom in the hot season, with its small white flowers, borne in crowded compact heads on the ends of the twigs. The great detraction from the beauty of the plant is the bareness of leaves on the stems, except at their extremities.

S. Nutans.—In general character very similar to the preceding, but with somewhat smaller and differently formed leaves; bears also similar flowers, but is rather shy of blooming.

GEUM.

G. atrosanguineum.—Bears large blood-red strawberry, blossom-like flowers ; but though raised easily from seed and kept from one cold season to another, in the vicinity of Calcutta, seldom or never blossoms. Nat. Ord. *Rosaceæ.*

KERRIA.

K. Japonica.—A twiggy description of shrub, usually grown nailed to walls in England, but never rising to more than a foot or so high here. Flowers in the form of a ball, of moderate size, very double, and bright yellow ; not a very ornamental plant anywhere and far from being so in this climate, where it thrives but indifferently. Nat. Ord. *Rosaceæ.*

HOLMSKIOLDIA.

H. coccinea.—A large, woody, spreading shrub, five to seven feet high ; in October and November, very curious flowers, in form like diminutive chamber-candlesticks, of a bright tawny red, in boundless profusion, and is then a most beautiful object ; requires to be cut closely in after flowering to keep it compact and within bounds. In a recently introduced variety the flowers are of a beautiful orange tint. Nat. Ord. *Verbenaceæ.* Propagated from cuttings, or from seed.

ITEA.

I. Virginica.—Don says : "When this shrub is in vigour it is entirely covered with racemes of white flowers, and then makes a fine appearance." Dr. Voigt mentions it in his catalogue as at that time lately introduced. It is quite unknown in the Government Botanical Gardens now. Nat. Ord. *Saxifrageæ.*

WATSONIA.

BUGLE LILY.

A genus of South African bulbous plants belonging to the *Irideæ.* Nearly allied to the Glandioli and requiring much the same treatment. But for bedding out they are hardier than the latter and remain longer in bloom. Only suited for hill stations in the south of India. The most effective species are *W. densiflora ; W. Meriana ; W. M. coccinea ; W. rosea* and *alba.*

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